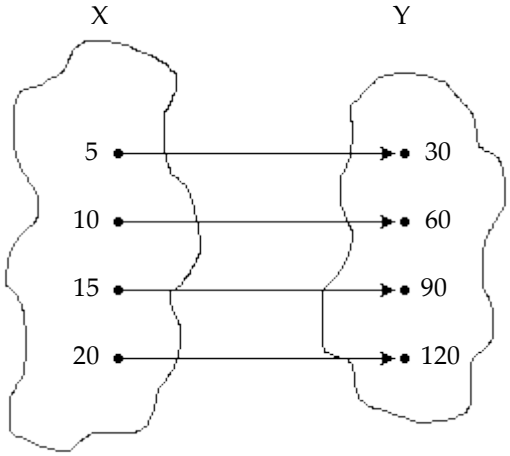
TEST BANK FOR INTERACTIVE APPLIED CALCULUS 1ST EDITION RITCHEY ISBN 9780134657189

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.

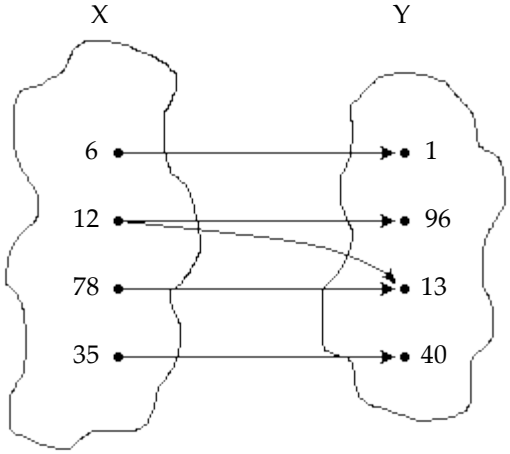
1)



A) Function B) Not a function

Answer: A

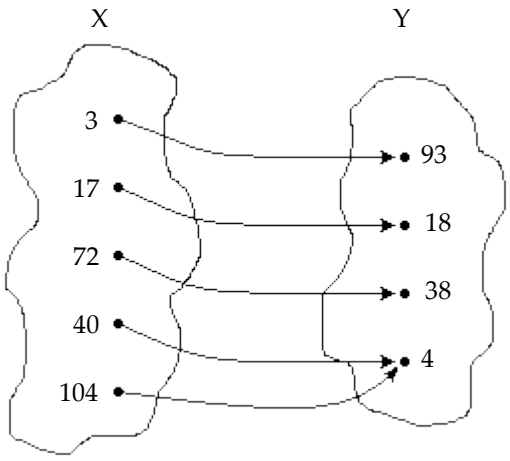
2)



A) Function B) Not a function

Answer: B

3)



A) Function B) Not a function

Answer: A

4)

x	y
–9	5
–9	4
–1	–7
6	3
8	7

A) Function B) Not a function

Answer: B

5)

x	y
–1	8
1	–5
4	–7
8	–3
12	5

A) Function B) Not a function

Answer: A

6) $y = x^2 + 3$

A) Function B) Not a function

Answer: A

7) $x = y^2 + 3$

A) Function B) Not a function

Answer: B

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

8) $y = x + 7$

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

Answer: C

9) $y = 2x - 1$

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

Answer: C

10) $3x + y = 11$

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

C) {–5, –7, –9, –11, –13} D) {–5, –8, –11, –14, –17}

Answer: B

11) $5x - y = 2$

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

Answer: D

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

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

Answer: D

13) $y = x^2$

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

Answer: D

14) $y = -4x^2$

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

Answer: D

15) $y = \dfrac{x}{x + 3}$

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

Answer: A

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

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

C) $\left\{-\frac{3}{11}, -\frac{1}{2}, -\frac{3}{7}, -\frac{3}{8}, -\frac{1}{3}\right\}$ D) $\left\{-\frac{3}{8}, -\frac{1}{4}, -\frac{3}{5}, -\frac{3}{5}, -1\right\}$

Answer: A

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

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

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

Answer: D

Give the domain of the function.

18) $f(x) = -8x - 2$

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

Answer: D

19) $f(x) = |7x + 5|$

A) $(-\infty, \infty)$ B) $[0, \infty)$ C) $\left(-\infty, -\frac{5}{7}\right] \cup \left(-\frac{5}{7}, \infty\right)$ D) $\left[-\frac{5}{7}, \infty\right)$

Answer: A

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

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

Answer: B

21) $f(x) = \frac{x^4 + 4}{x^2 + 5x - 36}$

A) $(-\infty, -9) \cup (-9, -4) \cup (-4, \infty)$ B) $(-\infty, 4) \cup (4, 9) \cup (9, \infty)$

C) $(-\infty, -9) \cup (-9, 4) \cup (4, \infty)$ D) $(-\infty, -4) \cup (-4, 9) \cup (9, \infty)$

Answer: C

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

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

Answer: D

23) $f(x) = \sqrt{20 - x}$

A) $(-\infty, \infty)$ B) $[0, 20]$ C) $(-\infty, 20) \cup (20, \infty)$ D) $(-\infty, 20]$

Answer: D

24) $f(x) = \sqrt{\frac{x + 4}{x - 9}}$

A) $(-4, 9)$ B) $(-\infty, -4) \cup (9, \infty)$ C) $(-\infty, -4] \cup [9, \infty)$ D) $(-\infty, -4] \cup (9, \infty)$

Answer: D

25) $g(z) = \sqrt{1 - z^2}$

A) $(-1, 1)$ B) $[-1, 1]$ C) $(-\infty, \infty)$ D) $[0, \infty)$

Answer: B

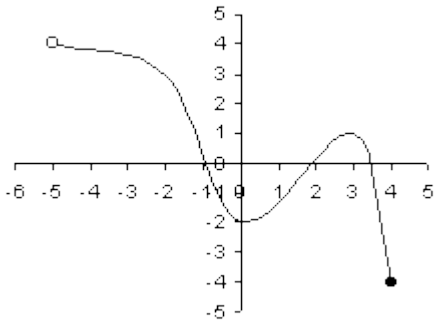
26) $f(x) = \frac{1}{\sqrt{x^2 + 5x - 24}}$

A) $(8, 3)$ B) $(-\infty, \infty)$ C) $(-\infty, 3) \cup (8, \infty)$ D) $(-\infty, -8) \cup (3, \infty)$

Answer: D

Give the domain and range of the function.

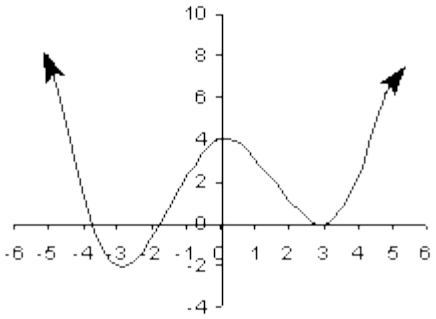
27)



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

Answer: C

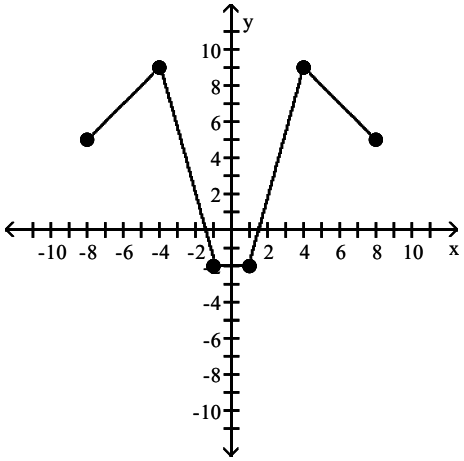
28)



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

Answer: A

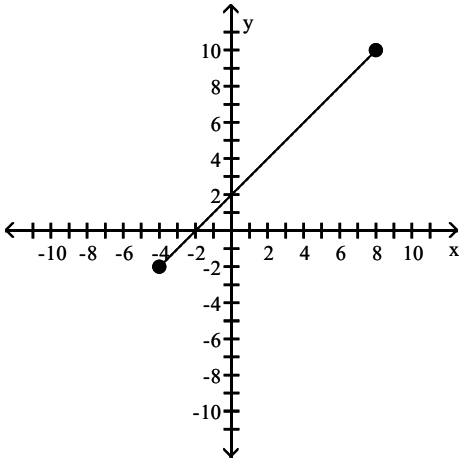
29)



A) Domain [–8, 8] ; Range [–2, 9]
B) Domain {–2, 5, 9} ; Range {–8, –4, –1, 1, 4, 8}
C) Domain {–8, –4, –1, 1, 4, 8} ; Range {–2, 5, 9}
D) Domain [–2, 9] ; Range [–8, 8]

Answer: A

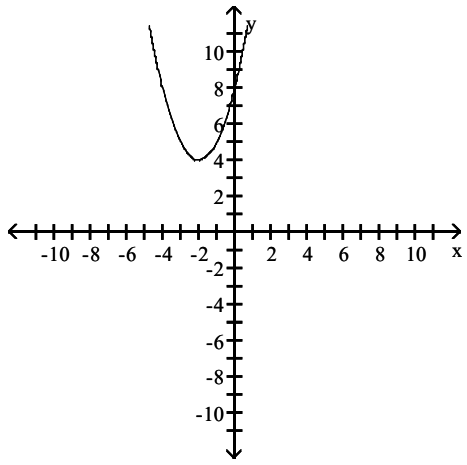
30)



A) Domain (–∞, ∞) ; Range (–∞, ∞)
B) Domain [–4, 8] ; Range [–2, 10]
C) Domain = (–4, 8) ; Range (–2, 10)
D) Domain {–4, 8} ; Range {–2, 10}

Answer: B

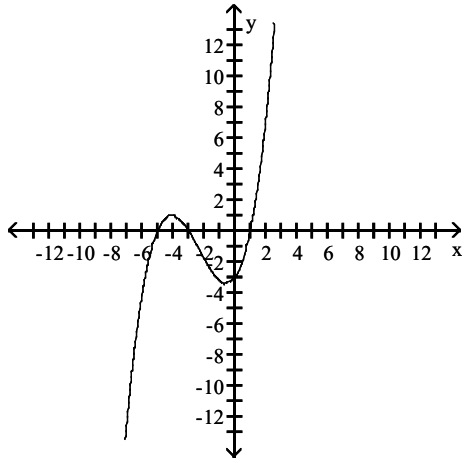
31)



A) Domain $(-\infty, \infty)$; Range $[4, \infty)$
B) Domain $(-\infty, 0)$; Range $(-\infty, 0)$
C) Domain $(-\infty, 0) \cup (0, \infty)$; Range $(-\infty, 0) \cup (0, \infty)$
D) Domain $(0, \infty)$; Range $[0, \infty)$

Answer: A

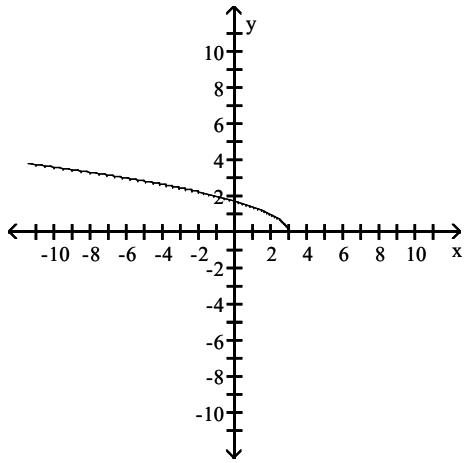
32)



A) Domain $(-\infty, \infty)$; Range $(-\infty, \infty)$
B) Domain $(-\infty, \infty)$; Range $\{-5, -3, 1\}$
C) Domain $(-\infty, \infty)$; Range $[-3, \infty)$
D) Domain $\{-5, -3, 1\}$; Range $(-\infty, \infty)$

Answer: A

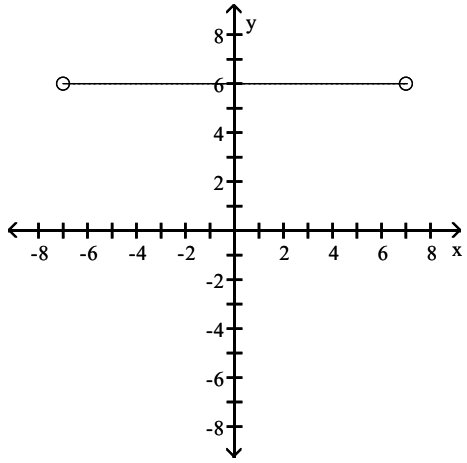
33)



A) Domain $(-\infty, 3]$; Range $[0, \infty)$
B) Domain $[0, \infty)$; Range $(-\infty, 3]$
C) Domain $(-\infty, \infty)$; Range $[0, \infty)$
D) Domain $(-\infty, 3) \cup (3, \infty)$; Range $(-\infty, 0) \cup (0, \infty)$

Answer: A

34)

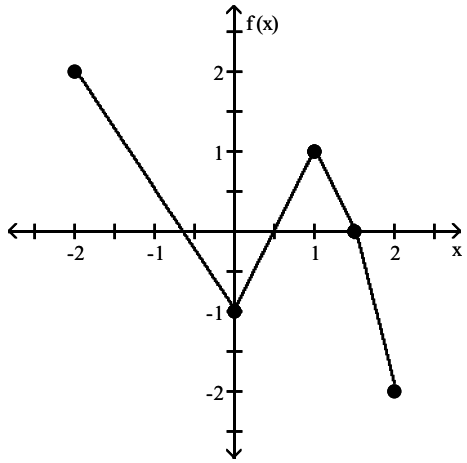


A) Domain $\{6\}$; Range $(-7, 7)$
B) Domain $(-7, 7)$; Range $\{6\}$
C) Domain $[-7, 7]$; Range $\{6\}$
D) Domain $(-\infty, \infty)$; Range $\{6\}$

Answer: B

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

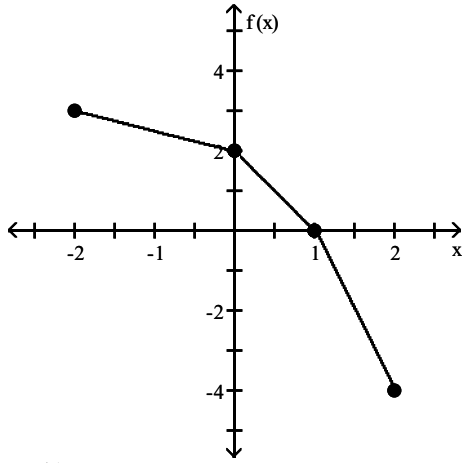
35) Find f(2).



A) –2
B) 2
C) 4
D) None of these are correct.

Answer: A

36) Find f(2).



A) –3
B) –2
C) –4
D) None of these are correct.

Answer: C

Evaluate the function.

37) $f(x) = x^2 + 5x + 1$; Find f(–3).

A) 23
B) 25
C) –5
D) –7

Answer: C

38) $f(x) = x^2 + 5x + 4$; Find f(0).

A) 0
B) –4
C) 4
D) 16

Answer: C

39) $f(x) = 4x^2 + 4x + 5$; Find f(–3).

A) 2
B) 19
C) 29
D) 53

Answer: C

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

A) 42 B) 28 C) 18 D) 12

Answer: C

41) $f(x) = \frac{x + 7}{x + 2}$; Find $f(-4)$.

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

Answer: D

42) $f(x) = \frac{5x}{2x - 4}$; Find $f(-5)$.

A) $\frac{25}{14}$ B) $\frac{25}{4}$ C) $\frac{5}{2}$ D) $-\frac{5}{2}$

Answer: A

43) $f(x) = 3x^2 + 5x + 6$; Find $f(a)$.

A) $3a^2 + 5a$ B) $8a + 6$ C) $3a^2 + 5a + 6$ D) $8a$

Answer: C

44) $f(x) = (x - 2)(x + 4)$; Find $f(a)$.

A) $(a - 2)(a + 4)$ B) $a^2 - 8$ C) $(a - 2)(a - 4)$ D) $a^2 + 8$

Answer: A

45) $f(x) = 5x^2 - 2x + 4$; Find $f(t - 1)$.

A) $5t^2 + 18t + 7$ B) $5t^2 - 12t + 11$ C) $-12t^2 + 5t + 11$ D) $5t^2 - 12t + 7$

Answer: B

46) $f(x) = 2x^2 + 4x + 3$; Find $f(r + h)$.

A) $2r^2 + 2rh + 2h^2 + 4r + 4h + 3$ B) $2r^2 + 2h^2 + 8r + 8h + 3$

C) $2r^2 + 4rh + 2h^2 + 4r + 4h + 3$ D) $2r^2 + 2h^2 + 4r + 4h + 3$

Answer: C

Evaluate the function for the given value.

47) $f(x) = \begin{cases} \frac{x - 6}{2x + 1} & \text{if } x \neq -\frac{1}{2} \\ 8 & \text{if } x = -\frac{1}{2} \end{cases}$; $f\left(-\frac{1}{2}\right)$

A) 8 B) 0 C) -4 D) $-\frac{13}{2}$

Answer: A

48) $f(x) = \begin{cases} \frac{x-8}{2x+3} & \text{if } x \neq -\frac{3}{2} \\ 9 & \text{if } x = -\frac{3}{2} \end{cases}$; f(8)

A) 72 B) $\frac{1}{19}$ C) 9 D) 0

Answer: D

49) $f(x) = \begin{cases} \frac{2x+3}{x-5} & \text{if } x \neq 5 \\ 6 & \text{if } x = 5 \end{cases}$; f(a)

A) $\frac{(2a+3)}{(a-5)}$ if $a \neq 5, 6$ if $a = 5$ B) 2 if $a \neq 5, 6$ if $a = 5$

C) $\frac{(2a+3)}{(a-3)}$ if $a = 5, 6$ if $a \neq 5$ D) 0 if $a \neq 5, 6$ if $a = 5$

Answer: A

50) $f(x) = \begin{cases} \frac{2x+4}{x-7} & \text{if } x \neq 7 \\ 14 & \text{if } x = 7 \end{cases}$; $f\left(\frac{2}{m}\right)$

A) $\frac{2}{m}$ if $m \neq \frac{2}{7}$, 14 if $m = \frac{2}{7}$ B) $\frac{(4m+4)}{(2m-7)}$ if $m \neq \frac{2}{7}$, 14 if $m = \frac{2}{7}$

C) $\frac{(4+4m)}{(2-7m)}$ if $m \neq \frac{2}{7}$, 14 if $m = \frac{2}{7}$ D) 2 if $m \neq \frac{2}{7}$, 14 if $m = \frac{2}{7}$

Answer: C

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

51) $f(x) = 5x - 13$

A) 5 B) $-5h$ C) 13 D) $\frac{13}{5}$

Answer: A

52) $f(x) = 3x^2 + 9x - 7$

A) $6x + 9$ B) $3x + 6 + 6h$ C) $6x + 9 + 3h$ D) $6xh + 9h + 9h^2$

Answer: C

53) $f(x) = \frac{13}{x+19}$

A) $\frac{-13}{(x+13)^2}$ B) $\frac{-247}{(x+h+19)(x+19)}$ C) $\frac{-13}{(x+h+19)(x+19)}$ D) $\frac{13}{(x+h+19)(x+19)}$

Answer: C

54) $f(x) = 6 - 8x^3$

A) $-3x^2$ B) $-8(3x^2 + 3xh + h^2)$ C) $-8(3x^2 - 3x - h)$ D) $-8(x^2 - xh - h^2)$

Answer: B

55) $f(x) = \frac{6}{x}$

A) 0 B) $-\frac{h}{x(x+h)}$ C) $-\frac{6}{(x+h)}$ D) $-\frac{6}{x(x+h)}$

Answer: D

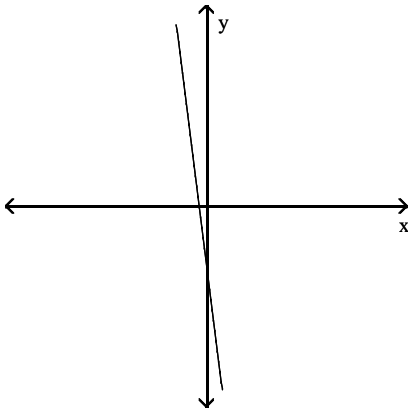
56) $f(x) = \frac{6}{x^2}$

A) $-\frac{12x+6h}{x^2(x^2+2hx+h^2)}$ B) $\frac{h}{x-h}$ C) $-\frac{6}{(x+h)}$ D) $-\frac{h}{x(x+h)}$

Answer: A

Decide whether the graph represents a function.

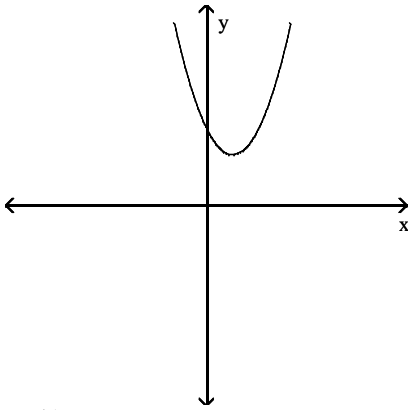
57)



A) Function B) Not a function

Answer: A

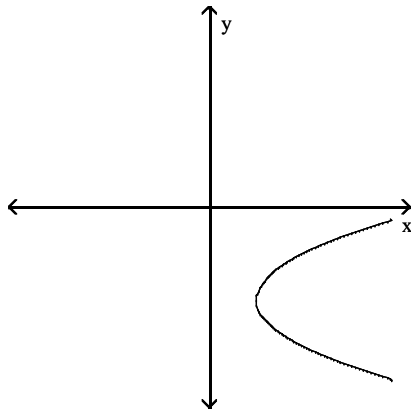
58)



A) Function B) Not a function

Answer: A

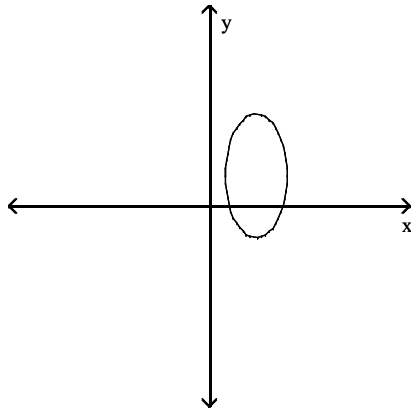
59)



A) Function B) Not a function

Answer: B

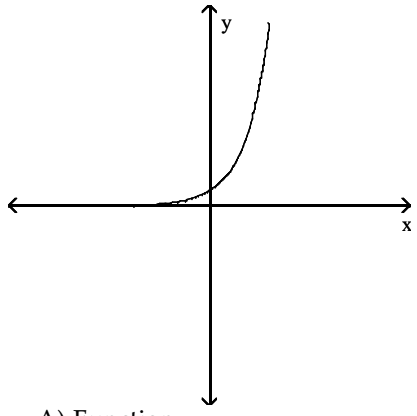
60)



A) Function B) Not a function

Answer: B

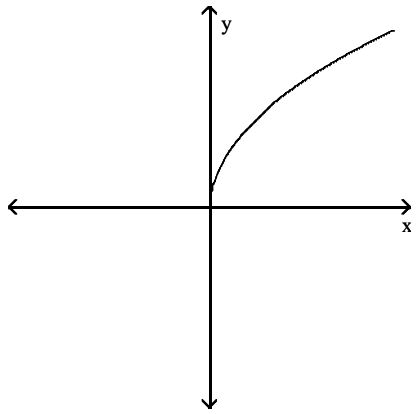
61)



A) Function B) Not a function

Answer: A

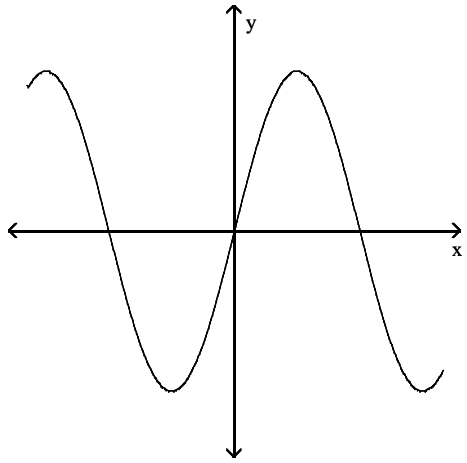
62)



A) Function B) Not a function

Answer: A

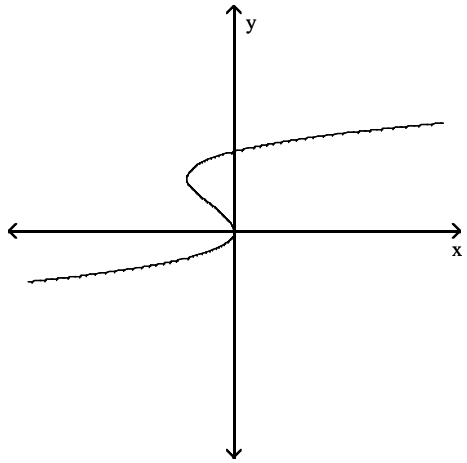
63)



A) Function B) Not a function

Answer: A

64)



A) Function B) Not a function

Answer: B

Classify the function as even, odd, or neither.

65) $f(x) = 5x$

A) Even B) Odd C) Neither

Answer: B

66) $f(x) = 6x^2$

A) Even B) Odd C) Neither

Answer: A

67) $f(x) = 2x^3$

A) Even B) Odd C) Neither

Answer: B

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

A) Even B) Odd C) Neither

Answer: A

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

A) Even B) Odd C) Neither

Answer: A

70) $f(x) = 6x^3 + 3$

A) Even B) Odd C) Neither

Answer: C

71) $f(x) = \dfrac{1}{x^2}$

A) Even B) Odd C) Neither

Answer: A

72) $f(x) = \dfrac{x}{x^2 + 3}$

A) Even B) Odd C) Neither

Answer: B

73) $f(x) = -3x^3 + 7x$

A) Even B) Odd C) Neither

Answer: B

74) $f(x) = |x^2 + x|$

A) Even B) Odd C) Neither

Answer: C

Solve the problem.

75) 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. Give the domain and range of the function.

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) None of these are correct.
B) Domain [1.5, 4.6]; Range [1992,1998]
C) Domain [1992,1998] ; Range [1.5, 4.6]
D) Domain (1992,1998) ; Range [1.5, 4.6]

Answer: C

76) A state park charges $13 per day or fraction of a day to rent a tent site, plus a fixed $7 park maintenance fee. Let T(x) represent the cost to stay in a tent site for x days. Find $T\left(7\frac{1}{2}\right)$.

A) $104.50
B) $111.00
C) $98.00
D) $91.00

Answer: B

77) A hummingbird adds 11 grams per day to its base body weight of 7 grams during the spring migration. Let T(x) represent the hummingbird's weight after x days. Find $T\left(8\frac{3}{5}\right)$.

A) 106 g
B) 101.60 g
C) 95 g
D) 88 g

Answer: B

78) Sue wants to put a rectangular garden on her property using 68 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.

A) $A(x) = 34x^2 - x$
B) $A(x) = 33x - \frac{1}{4}x^2$
C) $A(x) = 35x - 2x^2$
D) $A(x) = 34x - \frac{1}{2}x^2$

Answer: D

79) A farmer has 1800 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?

A) $A(x) = x^2 + 900x;\ \{x \mid 0 < x < 900\}$
B) $A(x) = -x^2 + 900x;\ \{x \mid 0 < x < 900\}$
C) $A(x) = -x^2 + 900x;\ \{x \mid 0 < x < 1800\}$
D) $A(x) = -x^2 + 1800x;\ \{x \mid 0 < x < 1800\}$

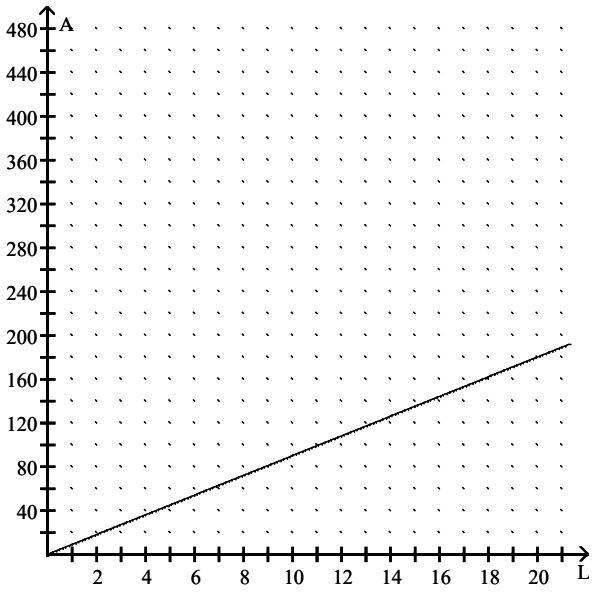
Answer: B

80) Suppose a life insurance policy costs $20 for the first unit of coverage and then $5 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?

A) $30 B) $70 C) $50 D) $65

Answer: D

81) 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 16 cm.



A) 162 cm^2 B) 117 cm^2 C) 144 cm^2 D) 126 cm^2

Answer: C

82) 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

$T = W^{1.19}$,

where W is the weight of the animal, in tons. Find the approximate territorial area of a rhinoceros who weights 3.3 tons. Round to the nearest hundredth.

A) 4.14 acres B) 0.24 acres C) 1.78 acres D) 0.56 acres

Answer: A

83) 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

$f(t) = 5 - 0.78t^{0.62}$,

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.

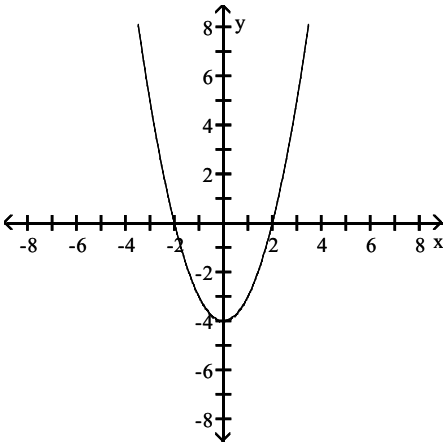
A) 2.37 gal B) 4.22 gal C) 2.63 gal D) 4.38 gal

Answer: C

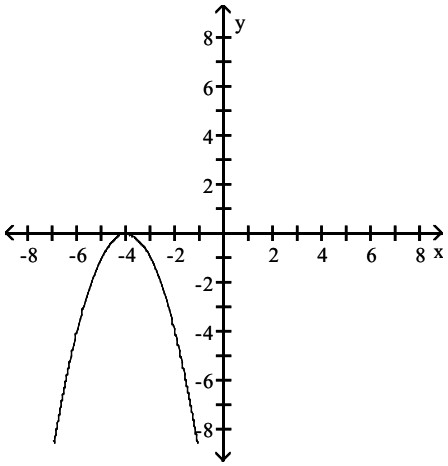
Match the correct graph to the given function.

84) $y = x^2 - 4$

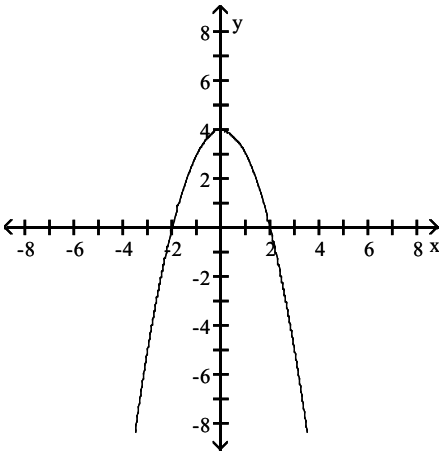
A)



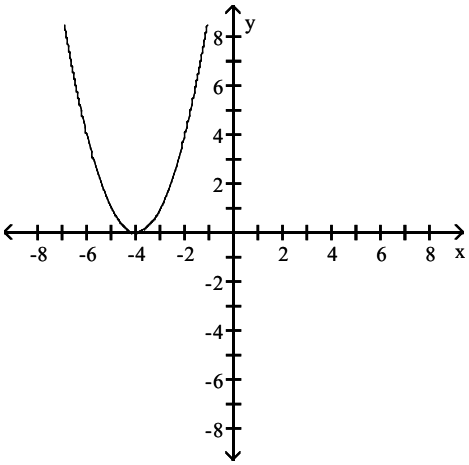
B)



C)



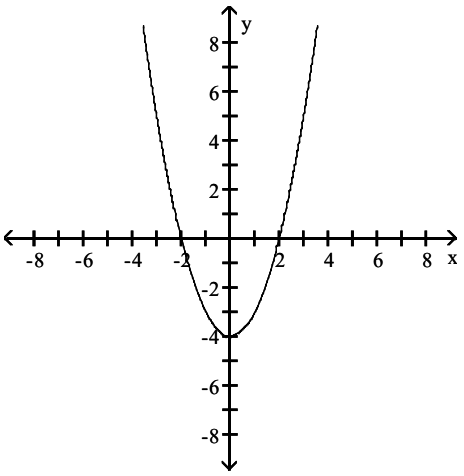
D)



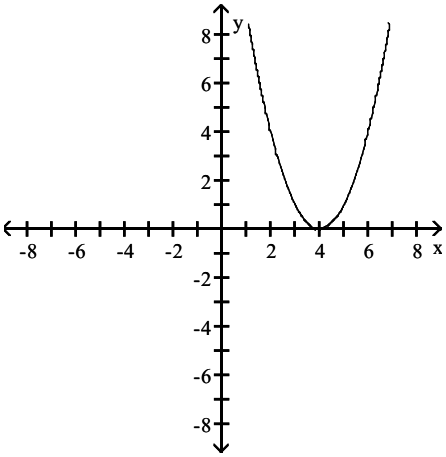
Answer: A

85) $y = x^2 + 4$

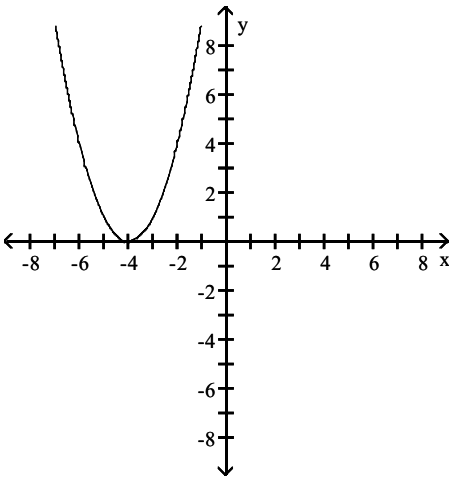
A)



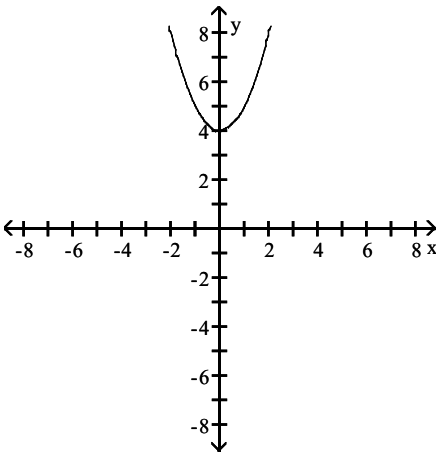
B)



C)



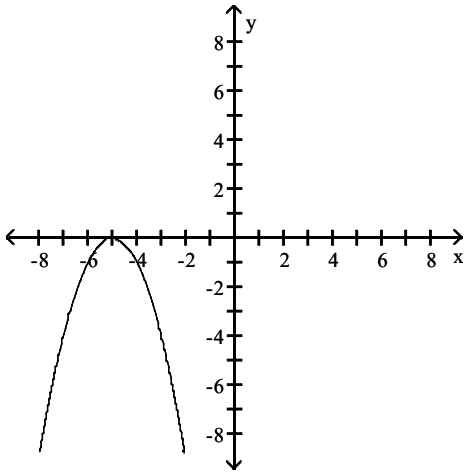
D)



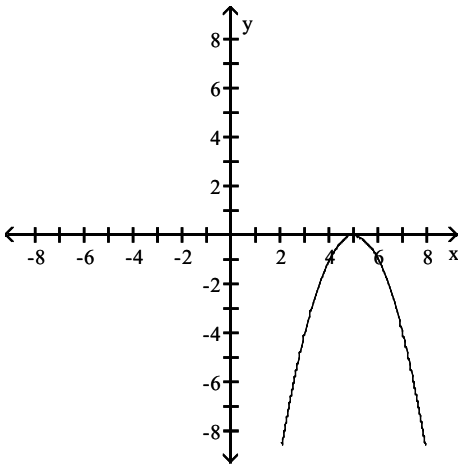
Answer: D

86) $y = (x + 5)^2$

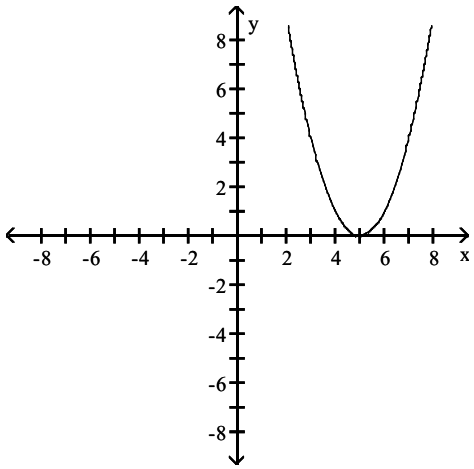
A)



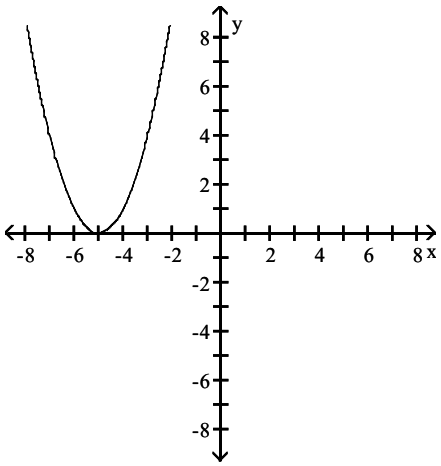
B)



C)



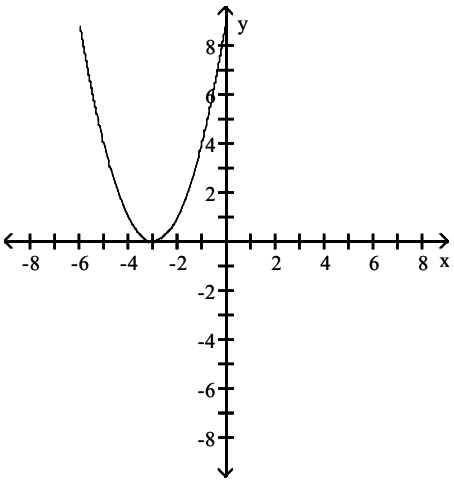
D)



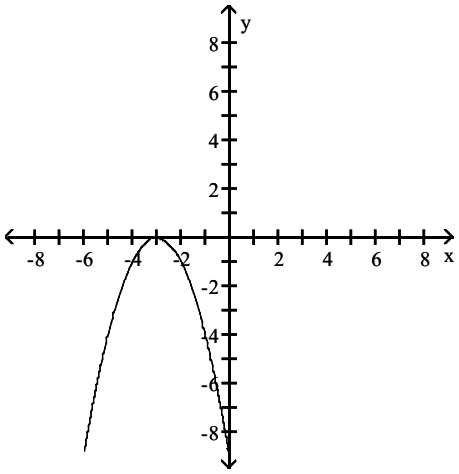
Answer: D

87) $y = (x - 3)^2$

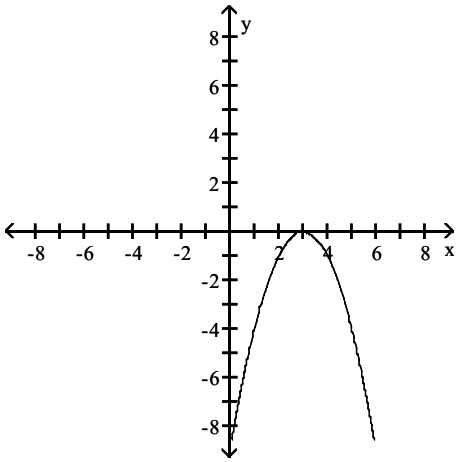
A)



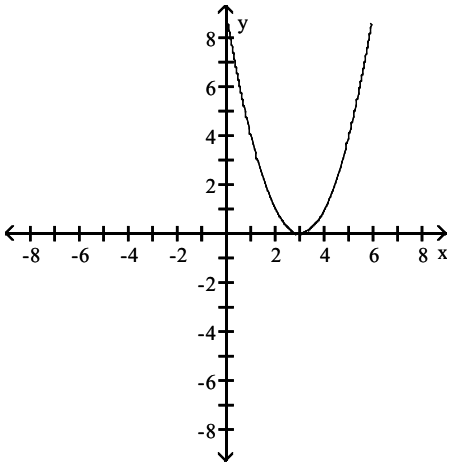
B)



C)



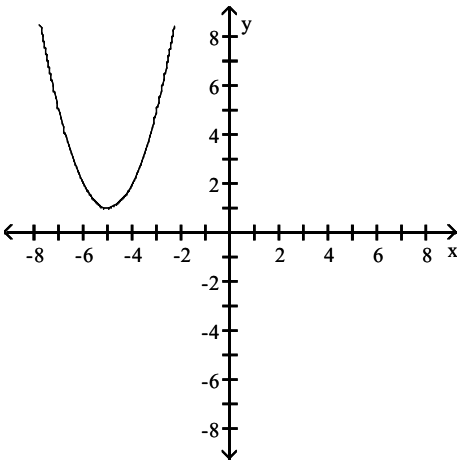
D)



Answer: D

88) $y = (x - 5)^2 + 1$

A)



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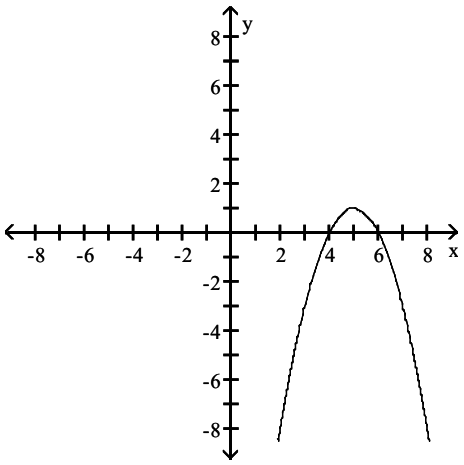
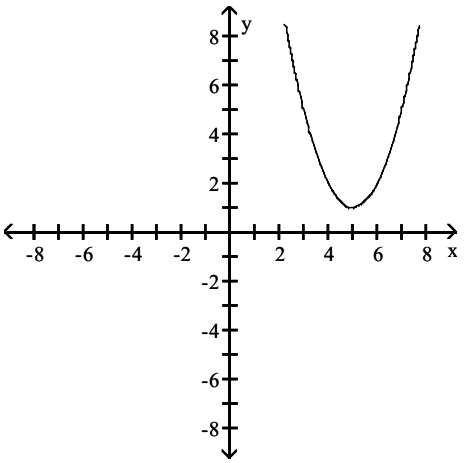
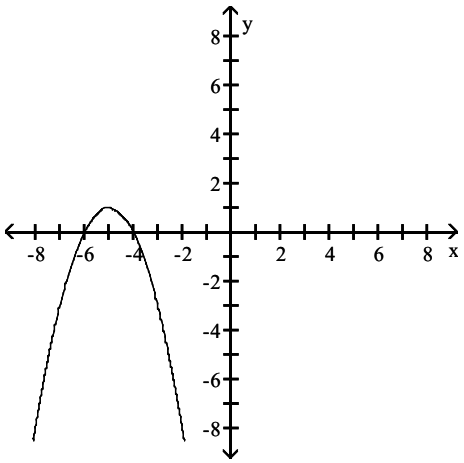


C)



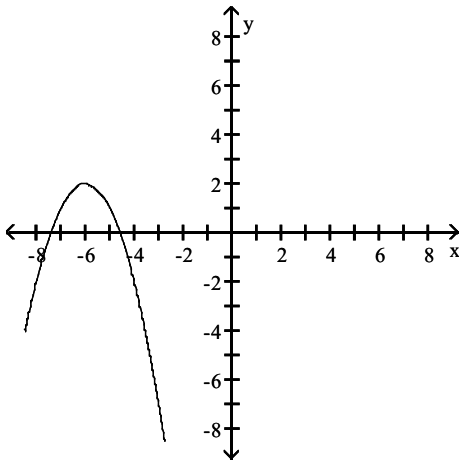
D)



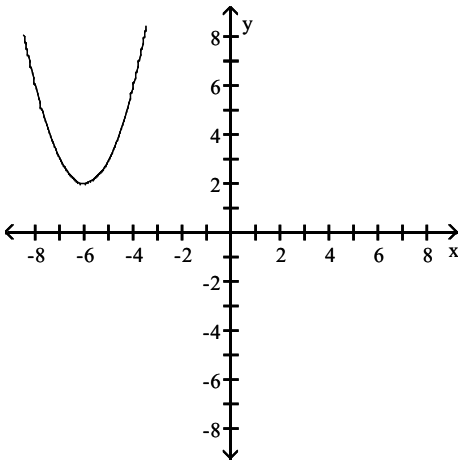
Answer: C

89) $y = -(x + 6)^2 + 2$

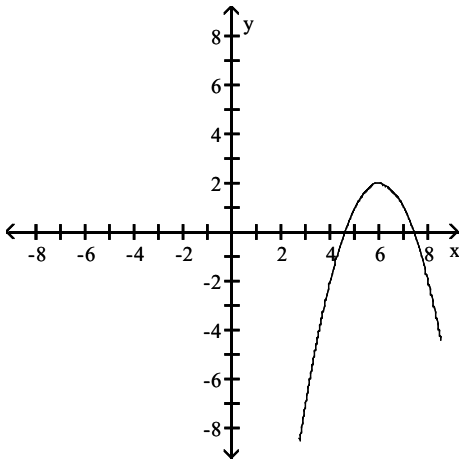
A)



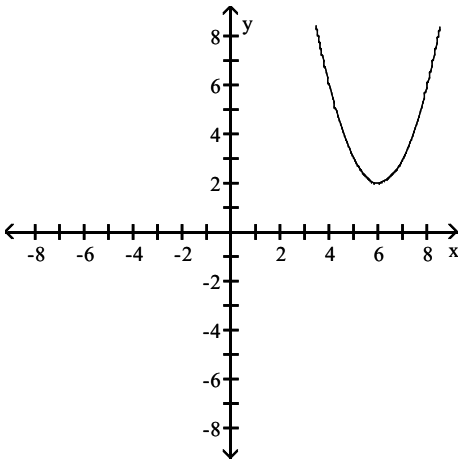
B)



C)



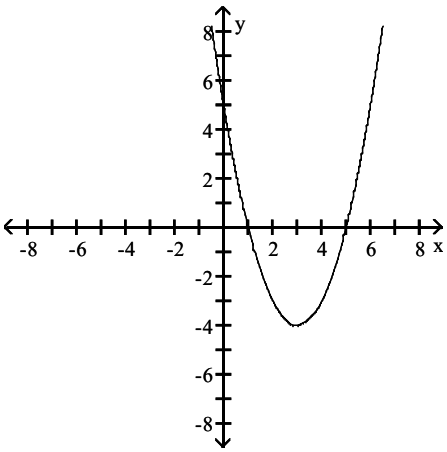
D)



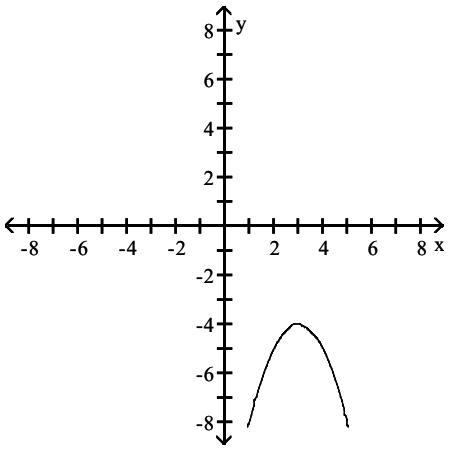
Answer: A

90) $y = -(3 - x)^2 - 4$

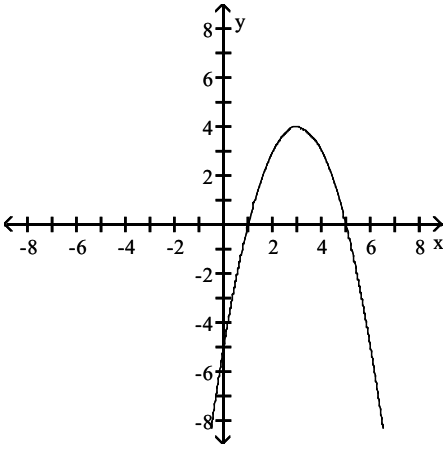
A)



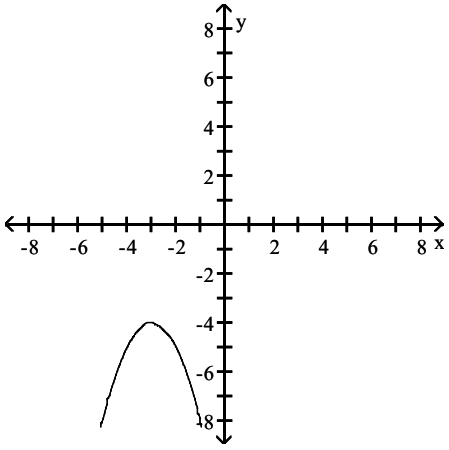
B)



C)



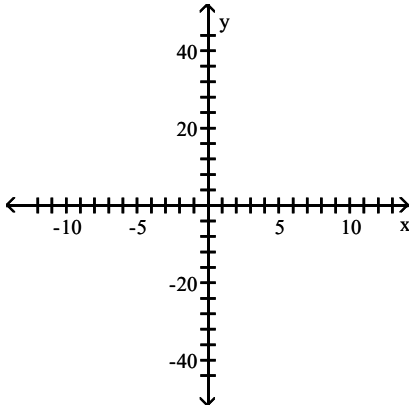
D)



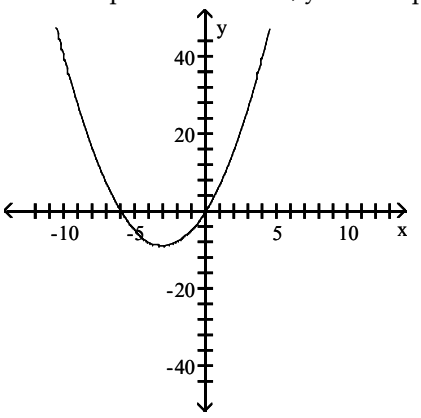
Answer: B

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

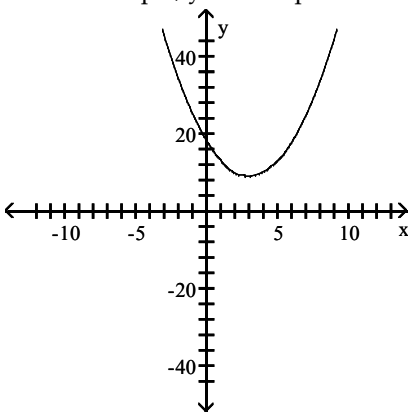
91) $f(x) = x^2 - 6x$



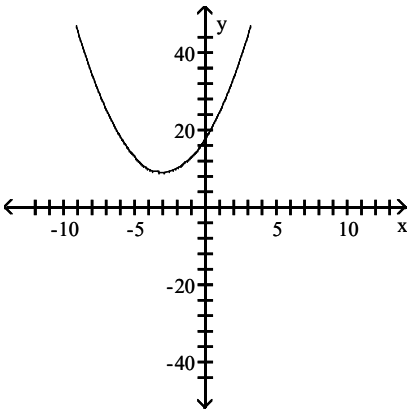
A) vertex (–3, –9); axis is x = –3;
x–intercepts are 0 and –6; y–intercept is 0



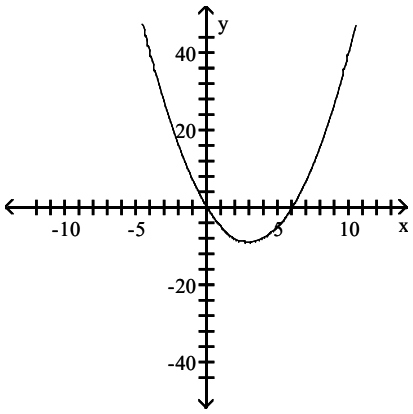
B) vertex (3, 9); axis is x = 3;
no x–intercepts; y–intercept is 18



C) vertex (–3, 9); axis is x = –3;
no x–intercepts; y intercept is 18

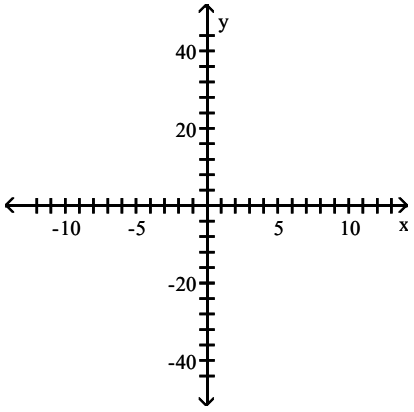


D) vertex (3, –9); axis is x = 3;
x–intercepts are 0 and 6; y–intercept is 0

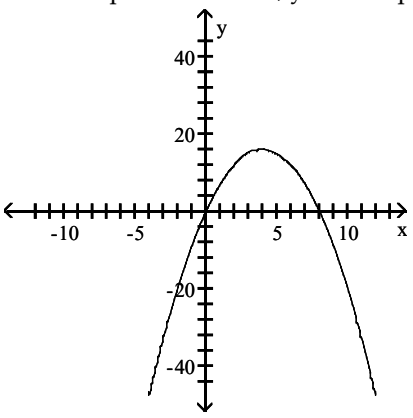


Answer: D

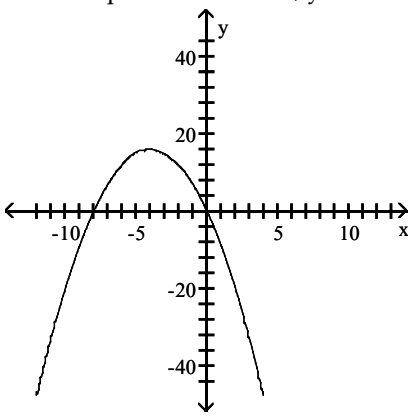
92) $f(x) = -x^2 + 8x$



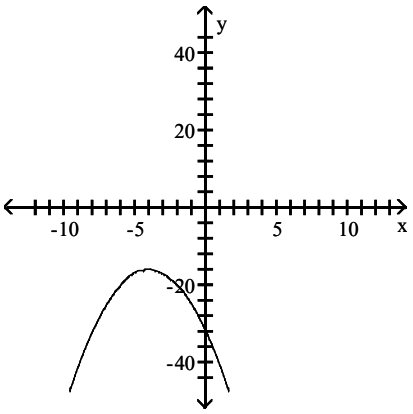
A) vertex (4, 16); axis is x = 4;
x–intercepts are 0 and 8; y–intercept is 0



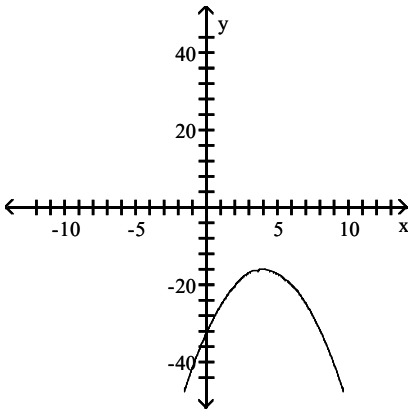
B) vertex (–4, 16); axis is x = –4;
x–intercepts are 0 and – 8; y–intercept is 0



C) vertex (–4, –16); axis is x = –4;
no x–intercepts; y–intercept is –32

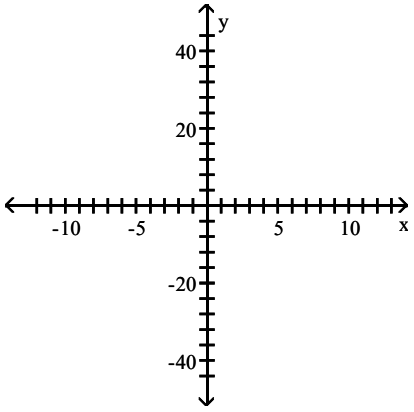


D) vertex (4, –16); axis is x = 4;
no x–intercepts; y–intercept is –32

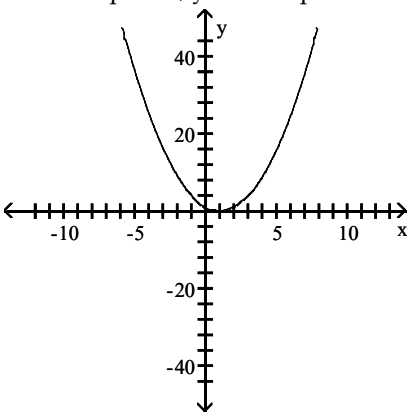


Answer: A

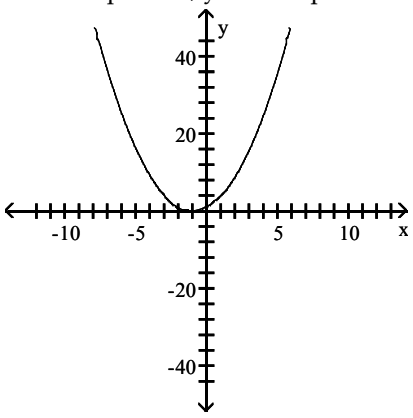
93) $f(x) = x^2 + 2x + 1$



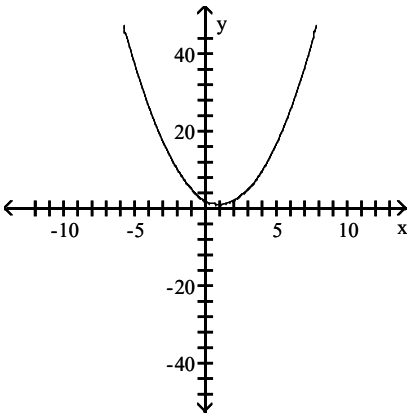
A) vertex (1, 0); axis is x = 1;
x–intercept is 1; y–intercept is 1



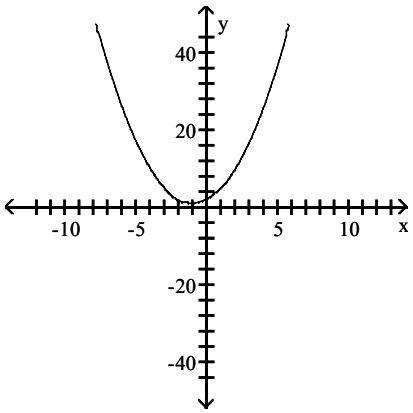
B) vertex (–1, 0); axis is x = –1;
x–intercept is –1; y–intercept is 1



C) vertex (1, 1); axis is x = 1;
no x–intercepts; y–intercept is 2

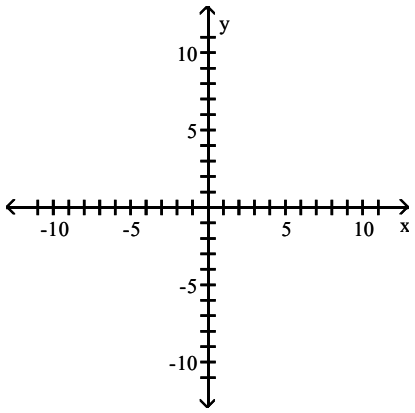


D) vertex (–1, 1); axis is x = –1;
no x–intercepts; y–intercept is 2

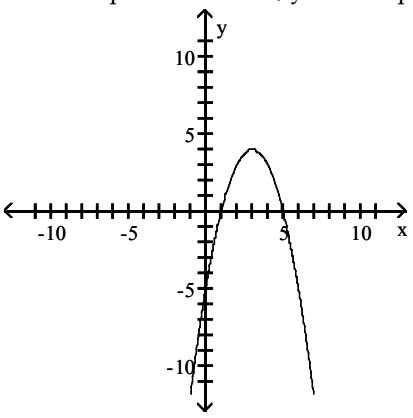


Answer: B

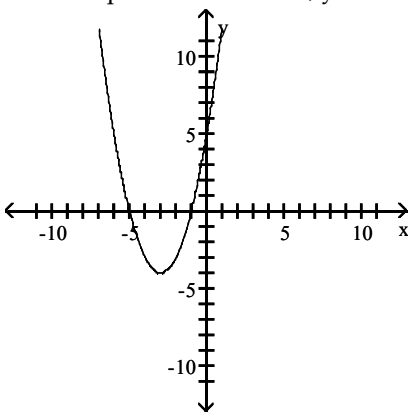
94) $f(x) = x^2 + 6x + 5$



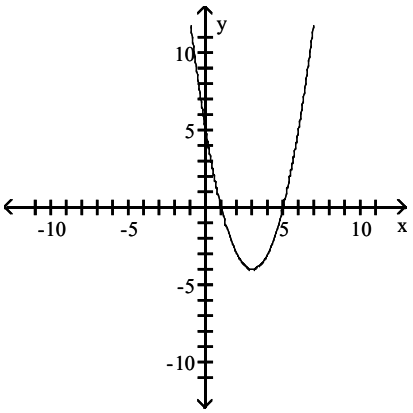
A) vertex (3, 4); axis is x = 3;
x–intercepts are 1 and 5; y–intercept is –5



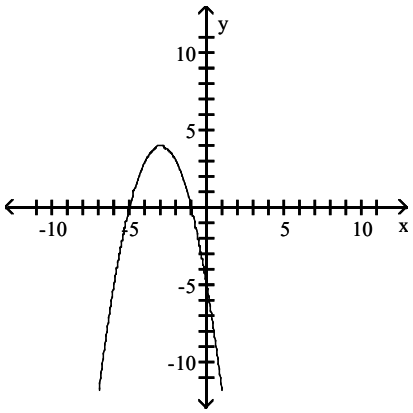
B) vertex (–3, –4); axis is x = –3;
x–intercepts are –1 and – 5; y–intercept is 5



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

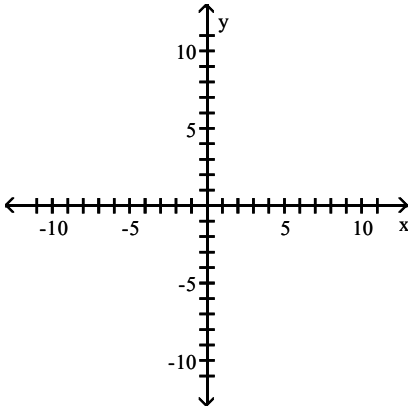


D) vertex (–3, 4); axis is x = –3;
x–intercepts are –1 and – 5; y–intercept is –5

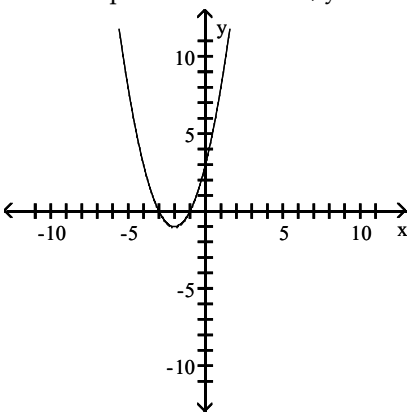


Answer: B

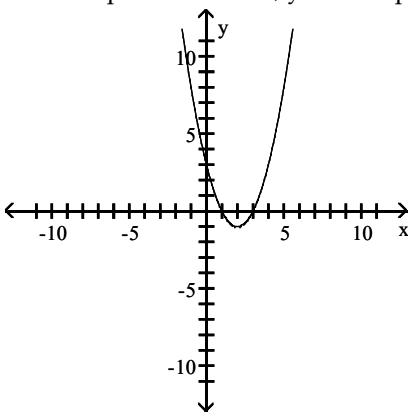
95) $f(x) = -x^2 - 4x - 3$



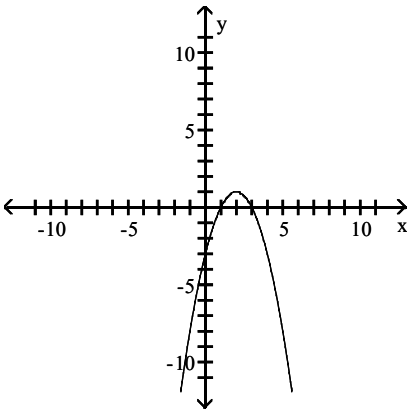
A) vertex (–2, –1); axis is x = –2;
x–intercepts are –1 and – 3; y–intercept is 3



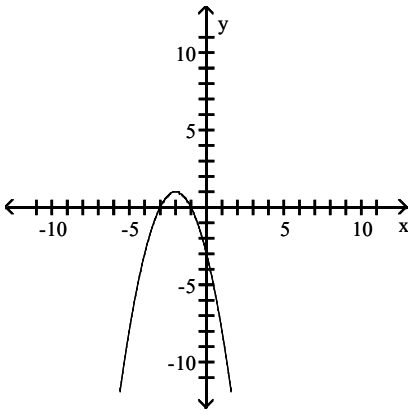
B) vertex (2, –1); axis is x = 2;
x–intercepts are 1 and 3; y–intercept is 3



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

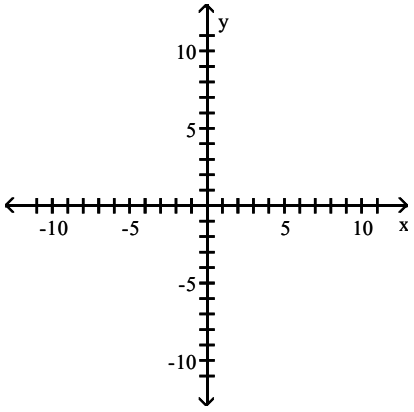


D) vertex (–2, 1); axis is x = –2;
x–intercepts are –1 and – 3; y–intercept is –3

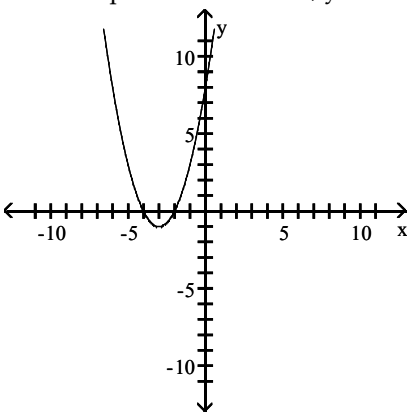


Answer: D

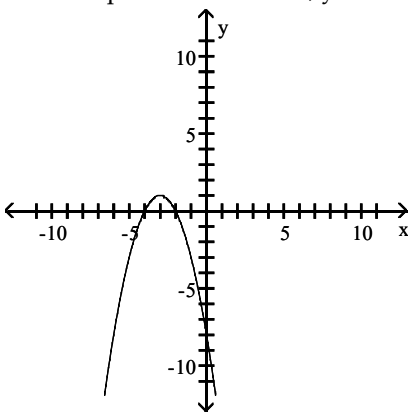
96) $f(x) = x^2 - 6x + 8$



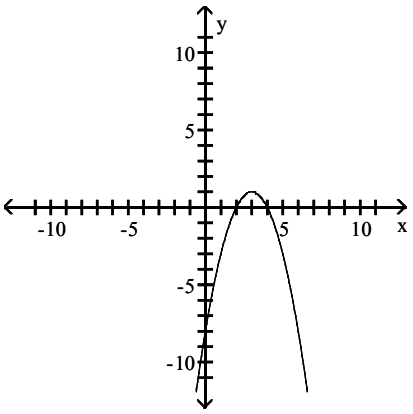
A) vertex (–3, –1); axis is x = –3;
x–intercepts are –4 and – 2; y–intercept is 8



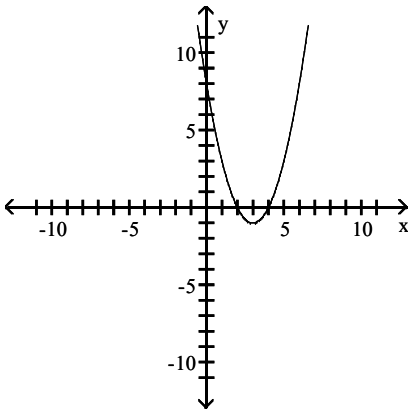
B) vertex (–3, 1); axis is x = –3;
x–intercepts are –4 and – 2; y–intercept is –8



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

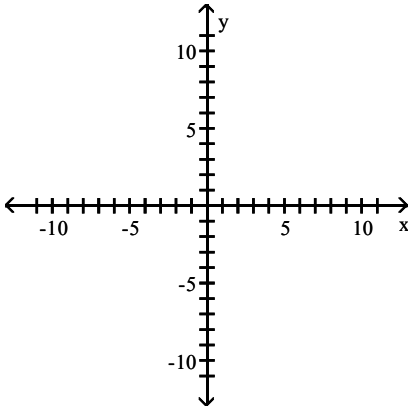


D) vertex (3, –1); axis is x = 3;
x–intercepts are 4 and 2; y–intercept is 8

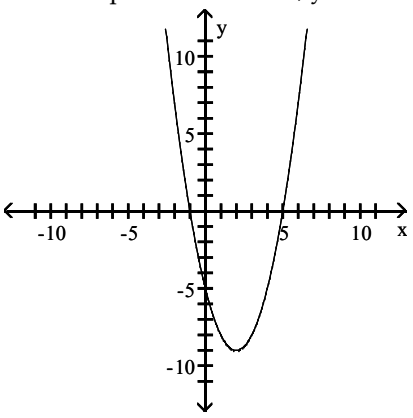


Answer: D

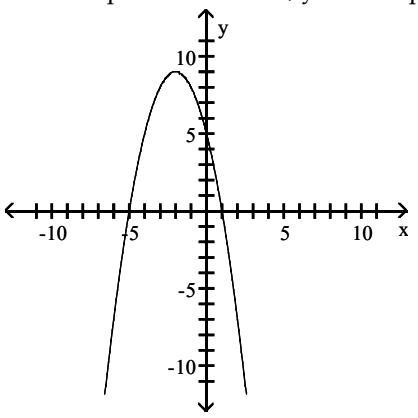
97) $f(x) = -x^2 + 4x + 5$



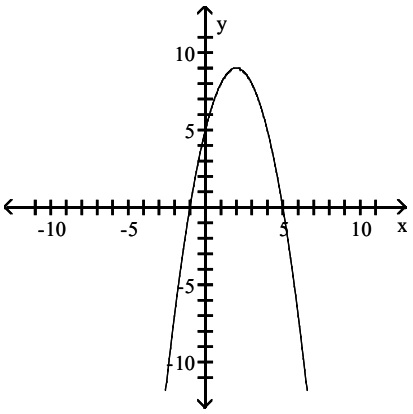
A) vertex (2, –9); axis is x = 2;
x–intercepts are 5 and – 1; y–intercept is –5



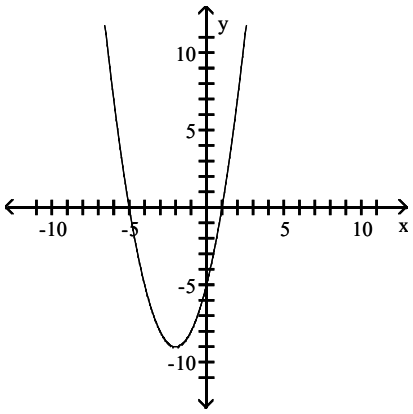
B) vertex (–2, 9); axis is x = –2;
x–intercepts are –5 and 1; y–intercept is 5



C) vertex (2, 9); axis is x = 2;
x–intercepts are 5 and – 1; y–intercept is 5

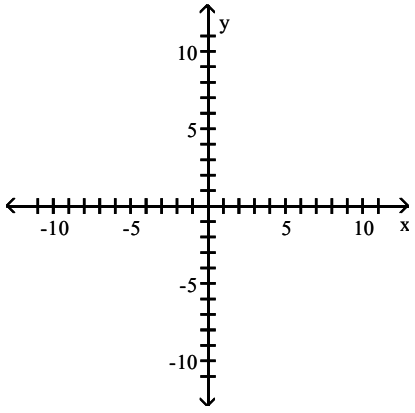


D) vertex (–2, –9); axis is x = –2;
x–intercepts are –5 and 1; y–intercept is –5

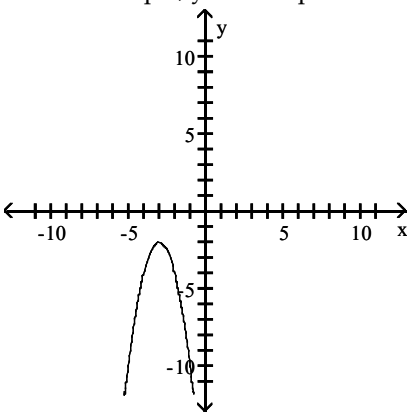


Answer: C

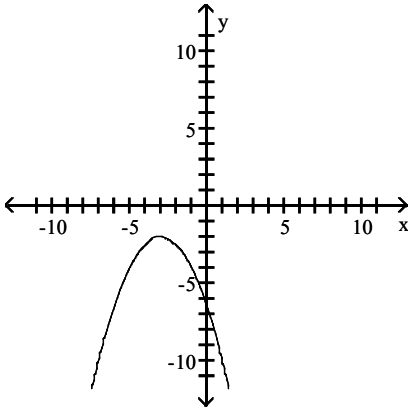
98) $f(x) = -2x^2 + 12x - 20$



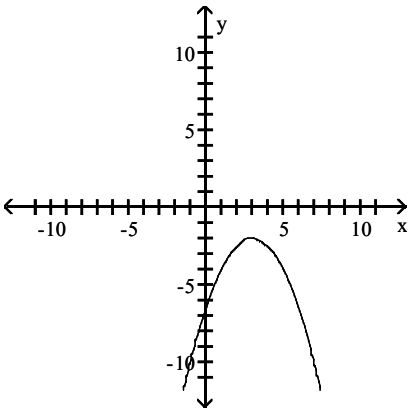
A) vertex (–3, –2); axis is x = –3;
no x–intercepts; y–intercept is –20



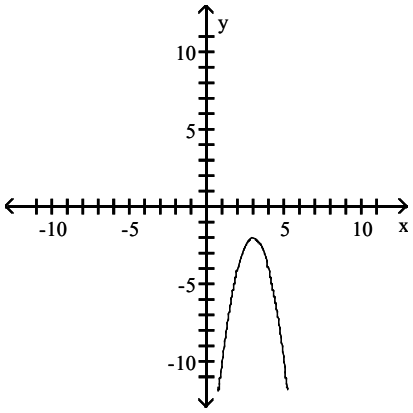
B) vertex (–3, –2); axis is x = –3;
no x–intercepts; y–intercept is $-\frac{13}{2}$



C) vertex (3, –2); axis is x = 3;
no x–intercepts; y–intercept is $-\frac{13}{2}$

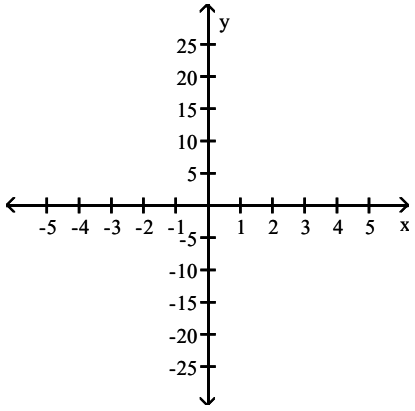


D) vertex (3, –2); axis is x = 3;
no x–intercepts; y–intercept is –20

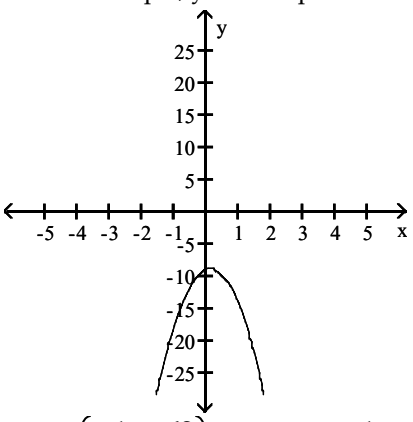


Answer: D

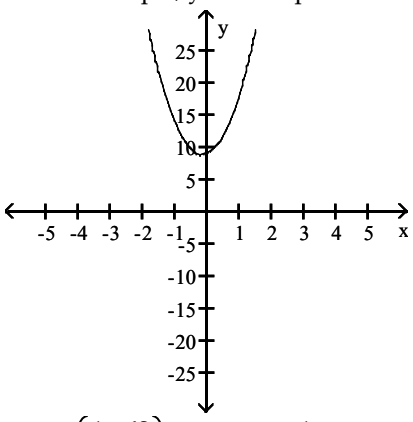
99) $f(x) = -7x^2 - 2x - 9$



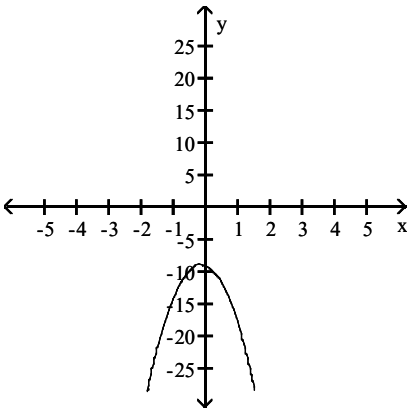
A) vertex $\left(\frac{1}{7}, -\frac{62}{7}\right)$; axis is $x = \frac{1}{7}$;
no x–intercepts; y–intercept is –9



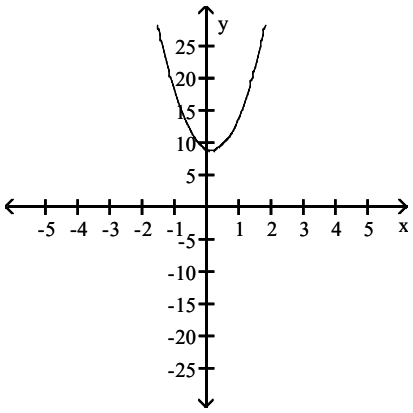
B) vertex $\left(-\frac{1}{7}, \frac{62}{7}\right)$; axis is $x = -\frac{1}{7}$;
no x–intercepts; y–intercept is 9



C) vertex $\left(-\frac{1}{7}, -\frac{62}{7}\right)$; axis is $x = -\frac{1}{7}$;
no x–intercepts; y–intercept is –9



D) vertex $\left(\frac{1}{7}, \frac{62}{7}\right)$; axis is $x = \frac{1}{7}$;
no x–intercepts; y–intercept is 9

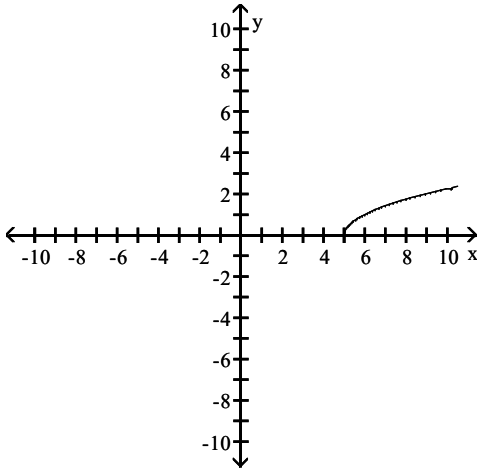


Answer: C

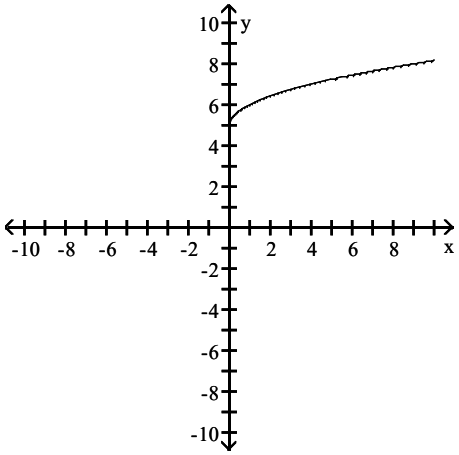
Match the correct graph to the given function.

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

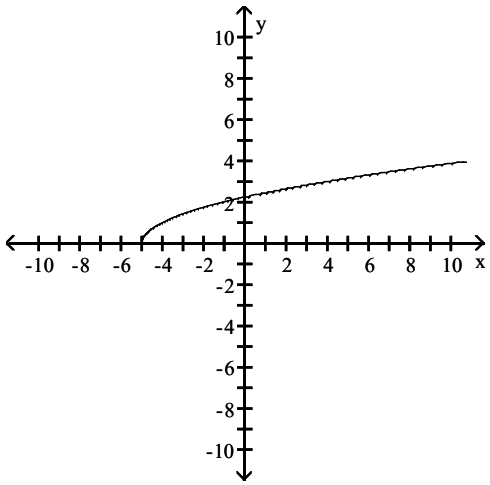
A)



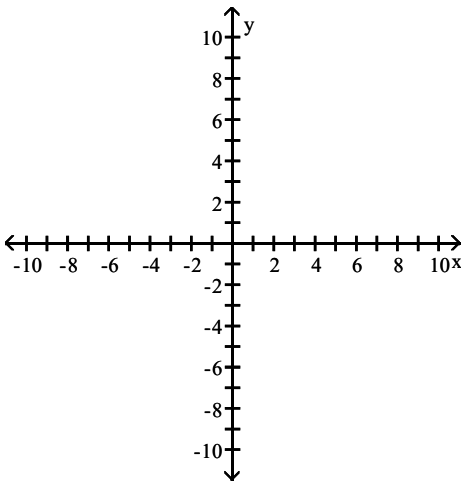
B)



C)



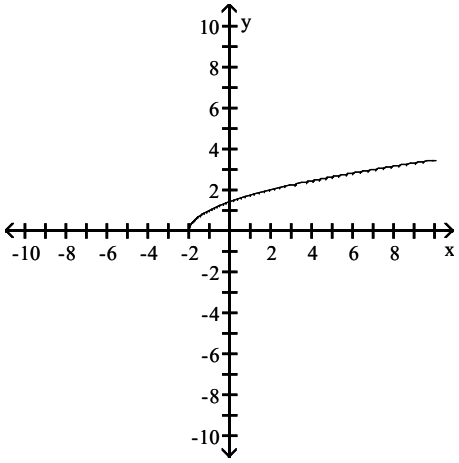
D)



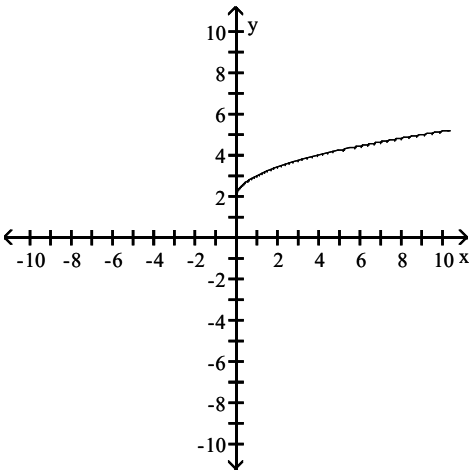
Answer: D

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

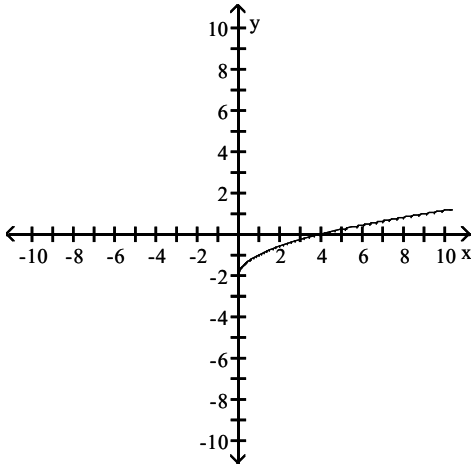
A)



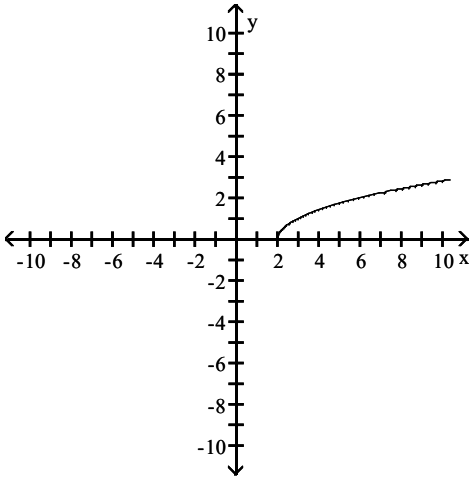
B)



C)



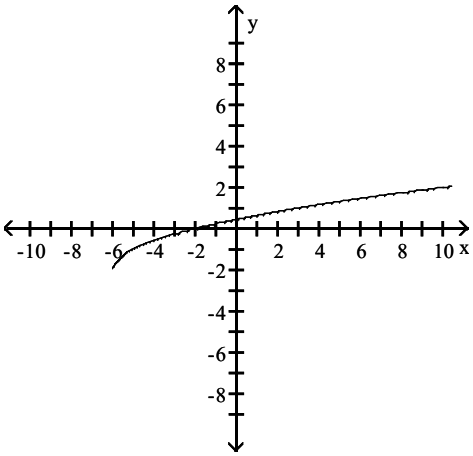
D)



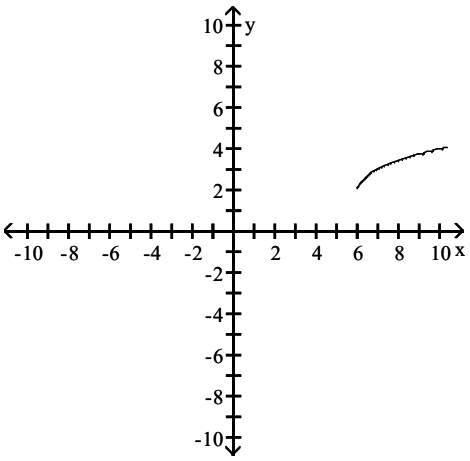
Answer: A

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

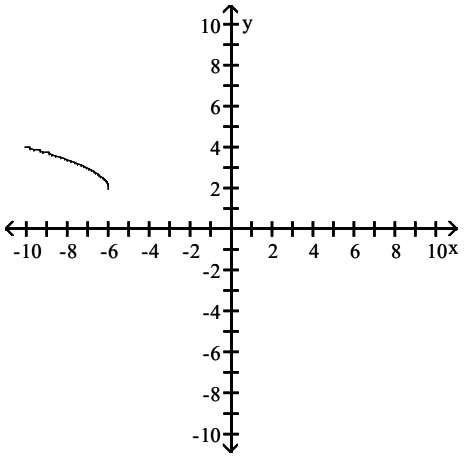
A)



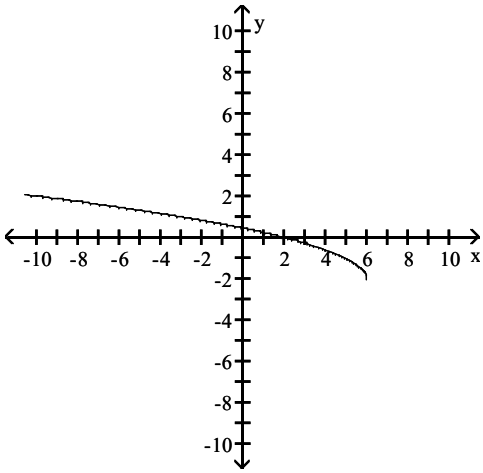
B)



C)



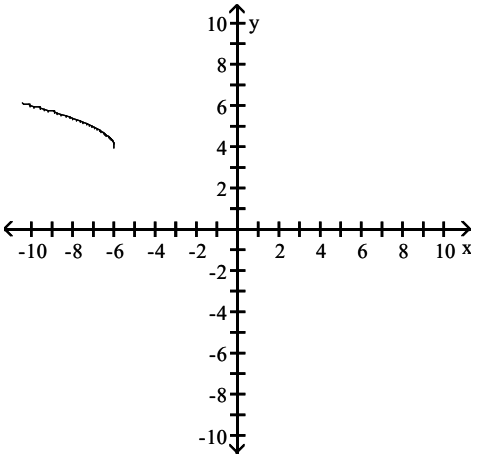
D)



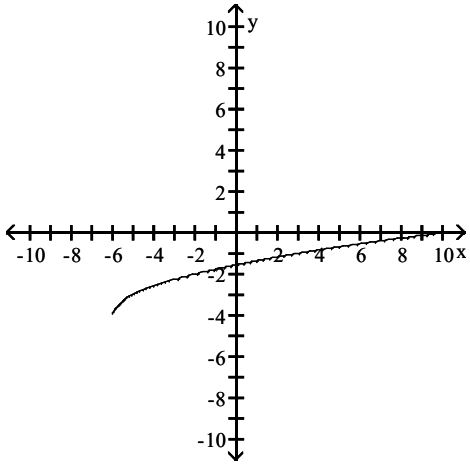
Answer: A

103) $y = \sqrt{x + 6} - 4$

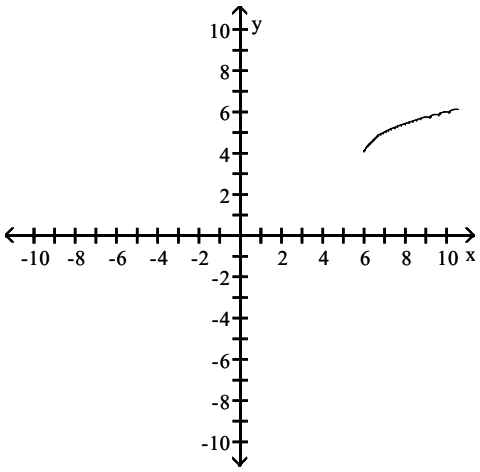
A)



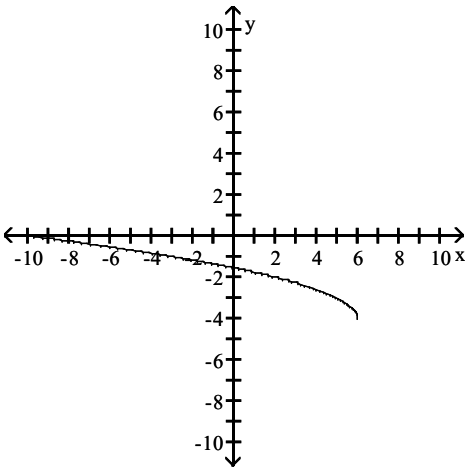
B)



C)



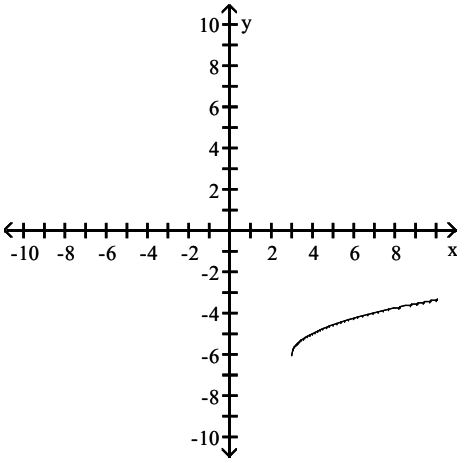
D)



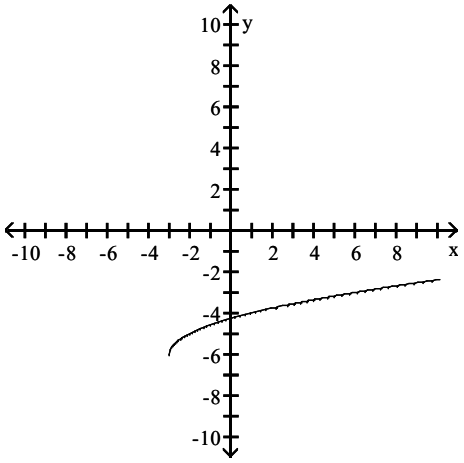
Answer: B

104) $y = \sqrt{-x + 3} - 6$

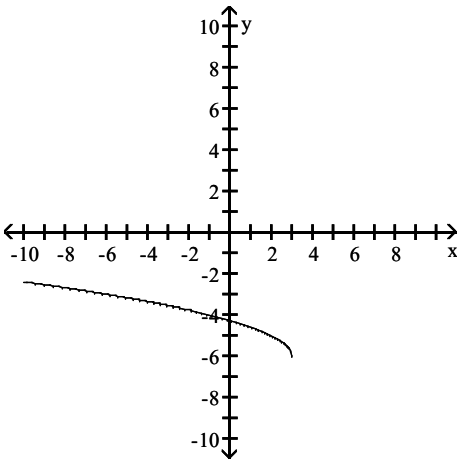
A)



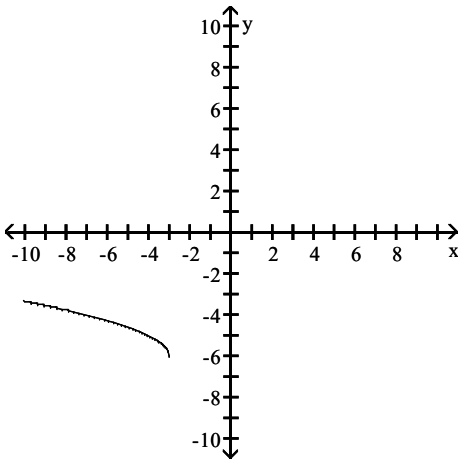
B)



C)



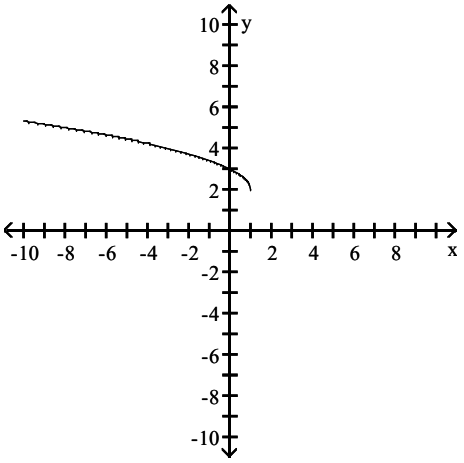
D)



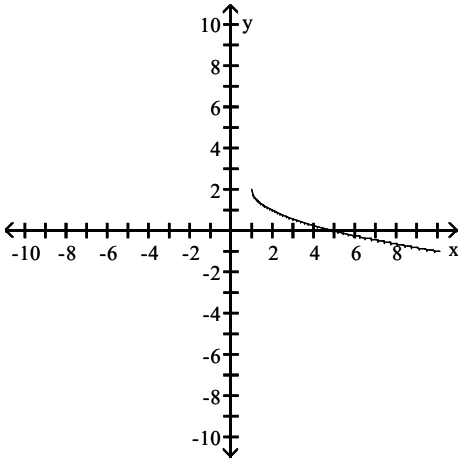
Answer: C

105) $y = -\sqrt{x + 1} + 2$

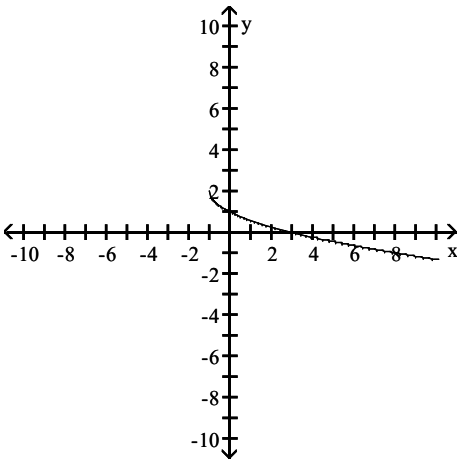
A)



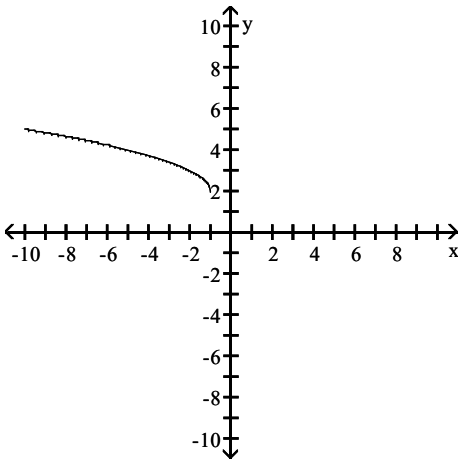
B)



C)

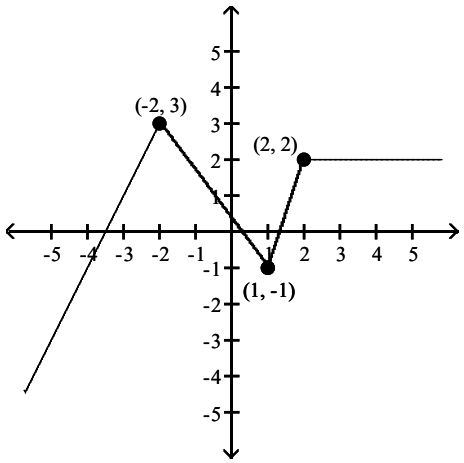


D)

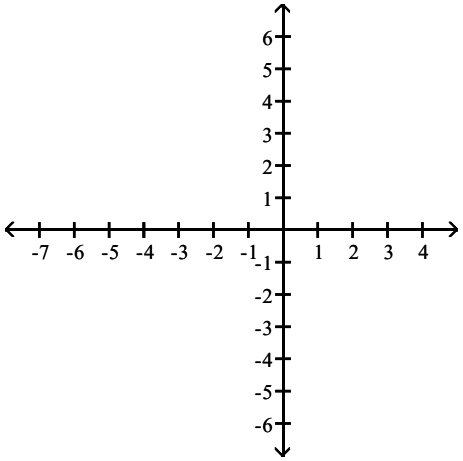


Answer: C

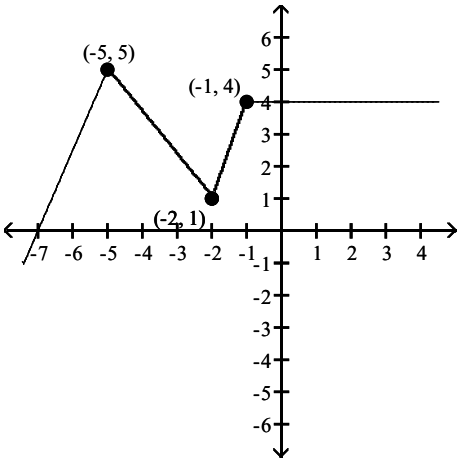
Using the graph below, sketch the graph of the given function.



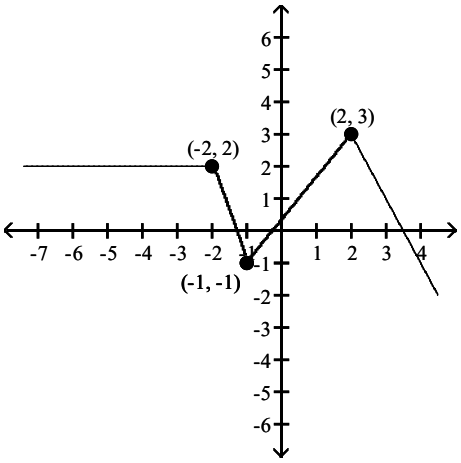
106) y = – f(x)



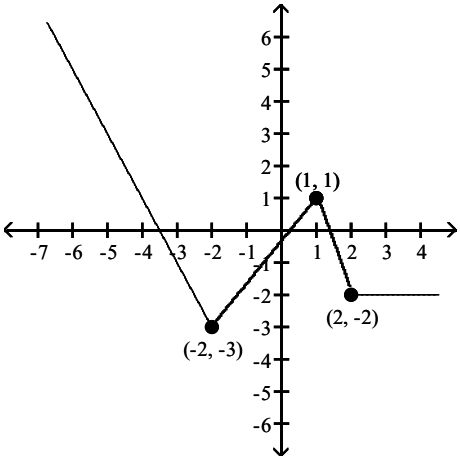
A)



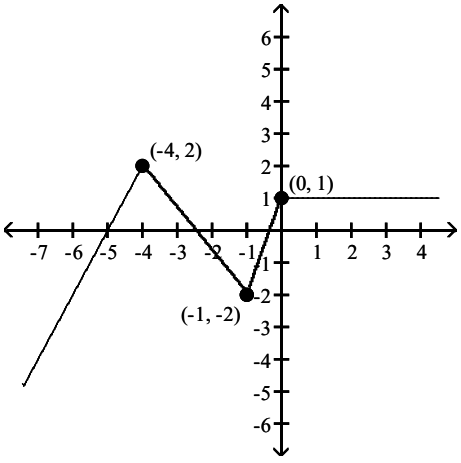
B)



C)

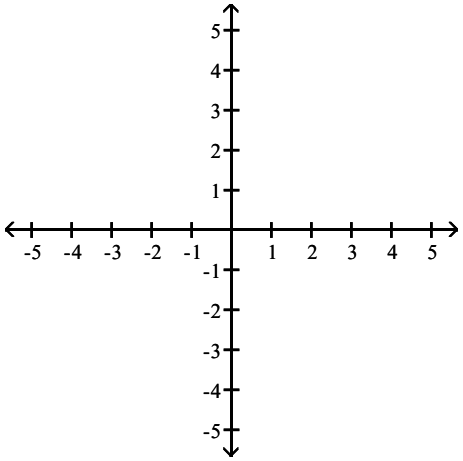


D)

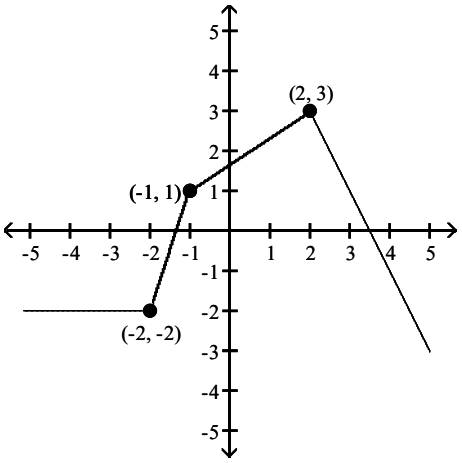


Answer: C

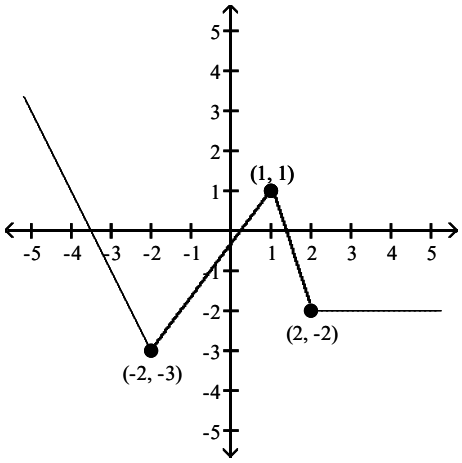
107) y = f(−x)



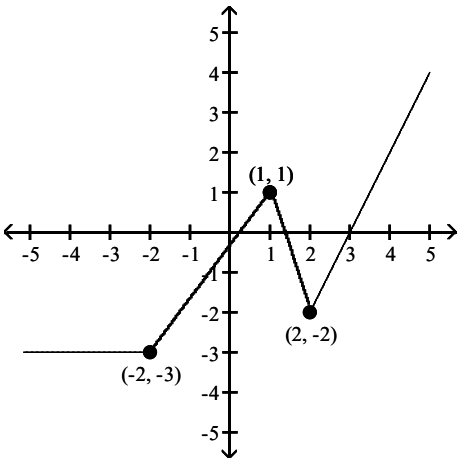
A)



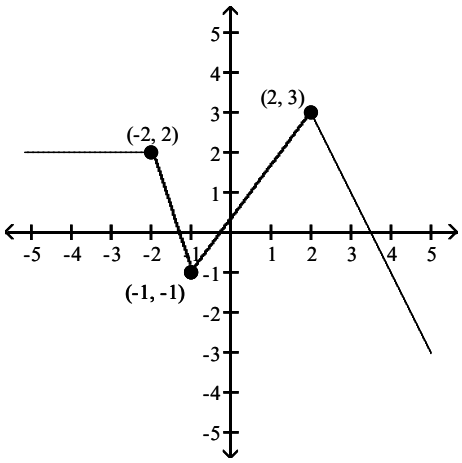
B)



C)

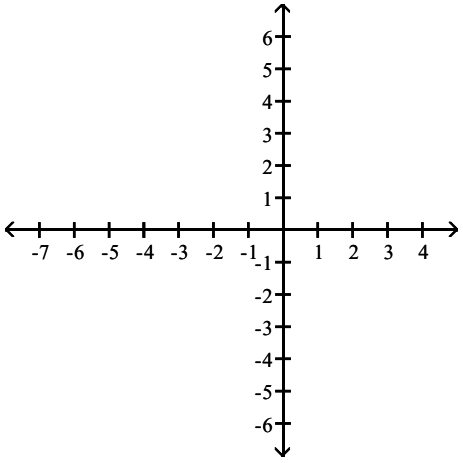


D)

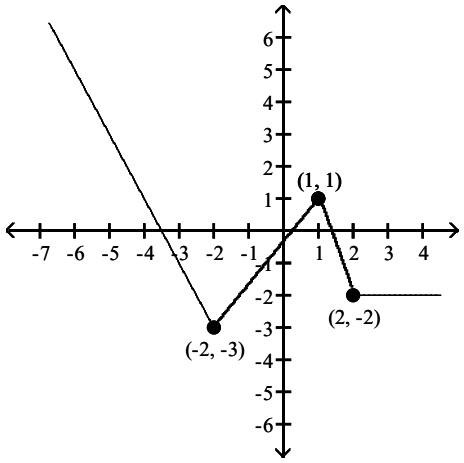


Answer: D

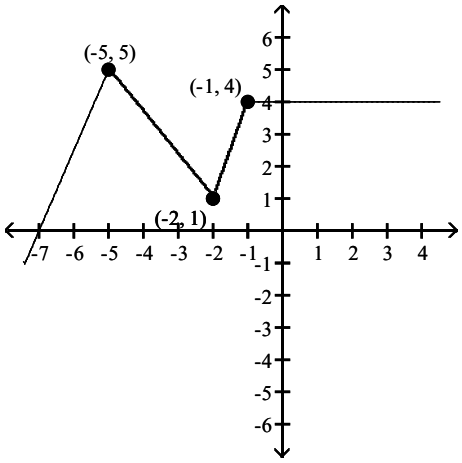
108) $y = f(x + 2) - 1$



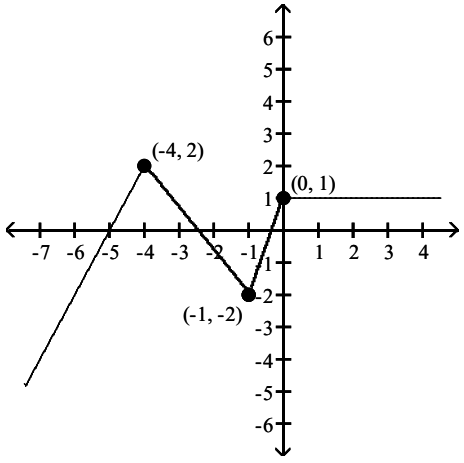
A)



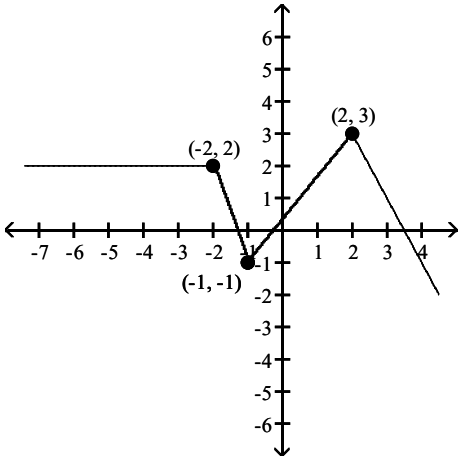
B)



C)

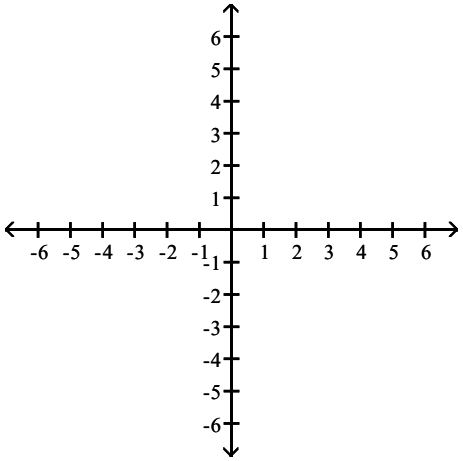


D)

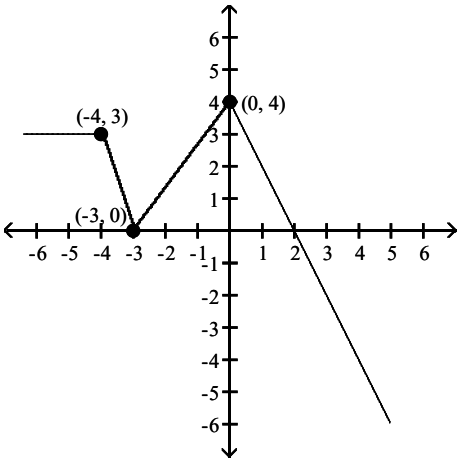


Answer: C

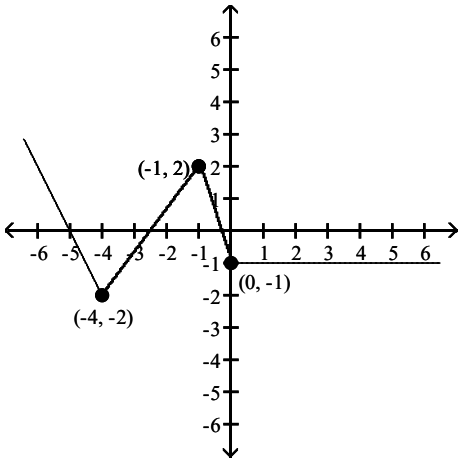
109) $y = f(-x - 2) + 1$



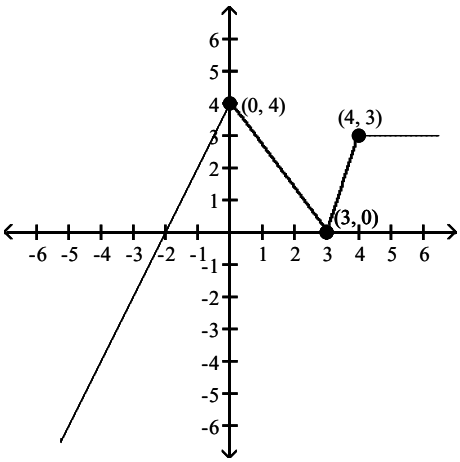
A)



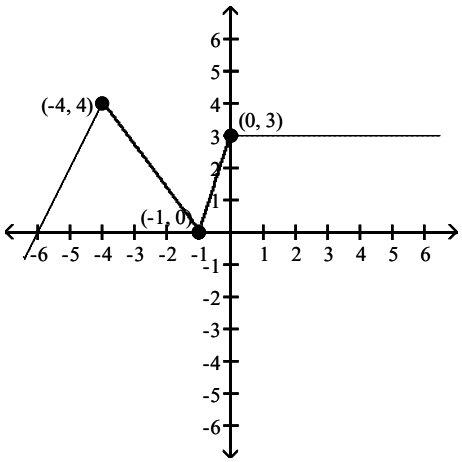
B)



C)



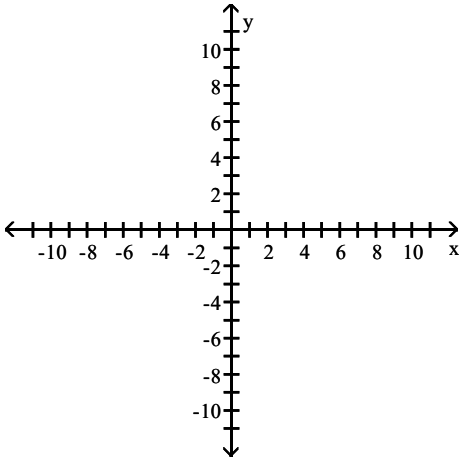
D)



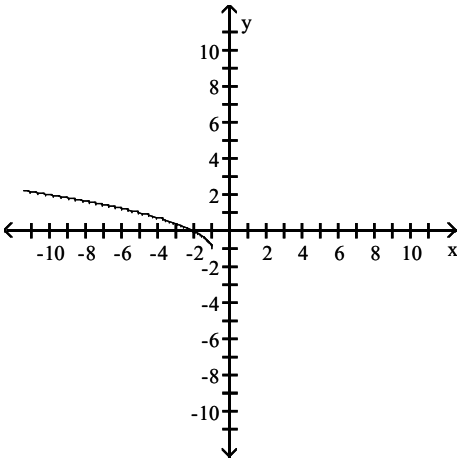
Answer: A

Graph the function.

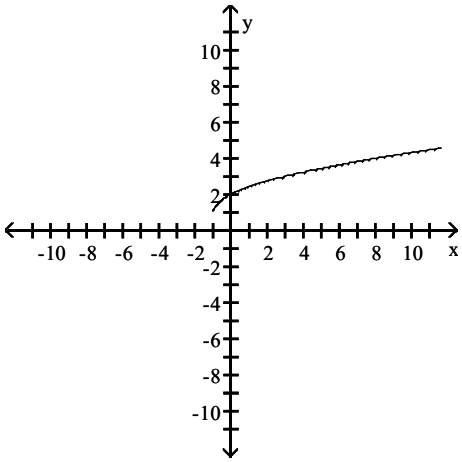
110) $f(x) = \sqrt{x - 1} - 1$



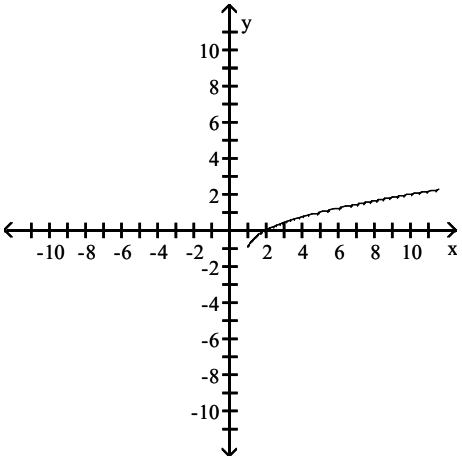
A)



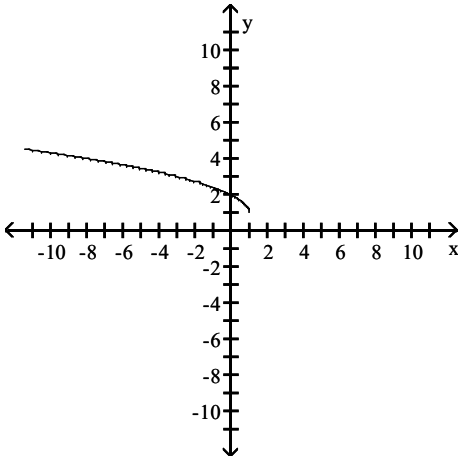
B)



C)

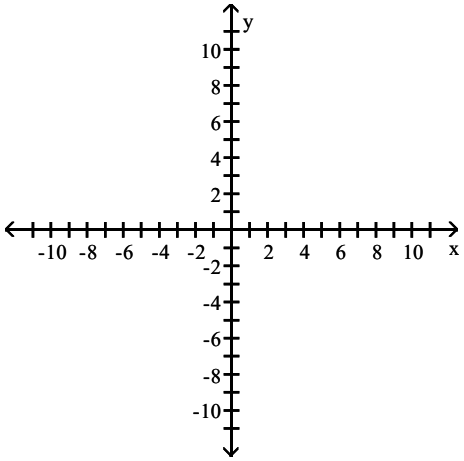


D)

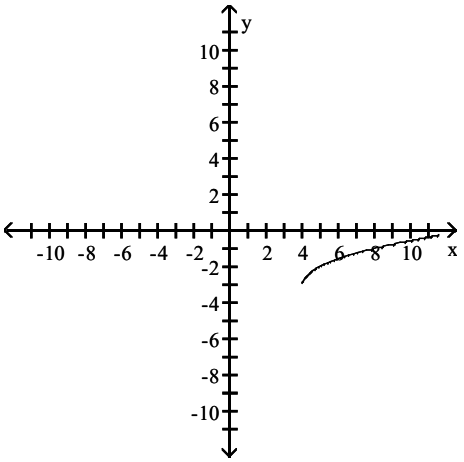


Answer: C

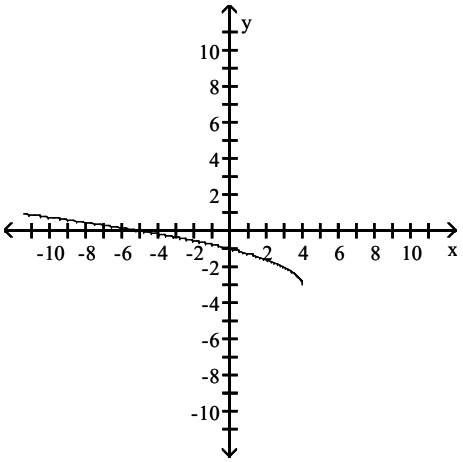
111) $f(x) = \sqrt{4 - x} - 3$



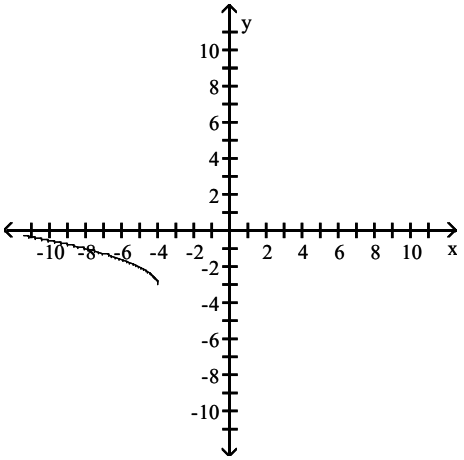
A)



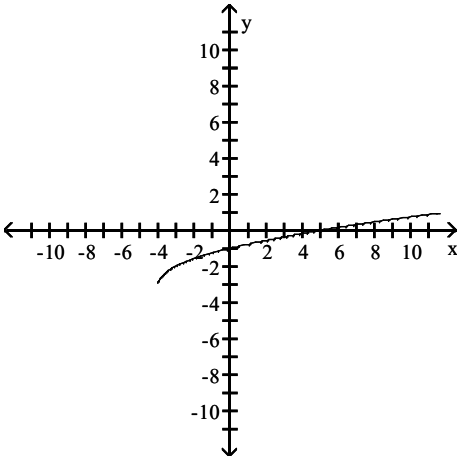
B)



C)

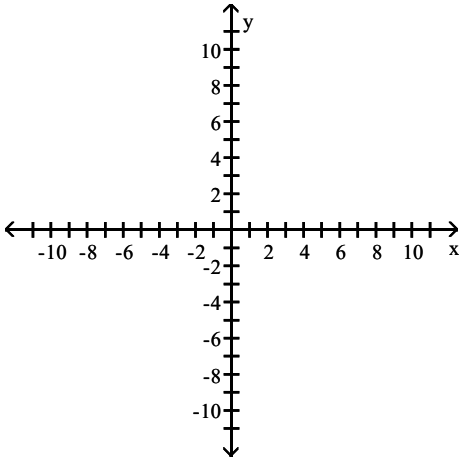


D)

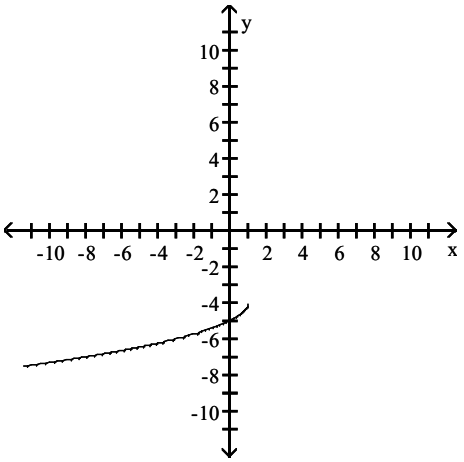


Answer: B

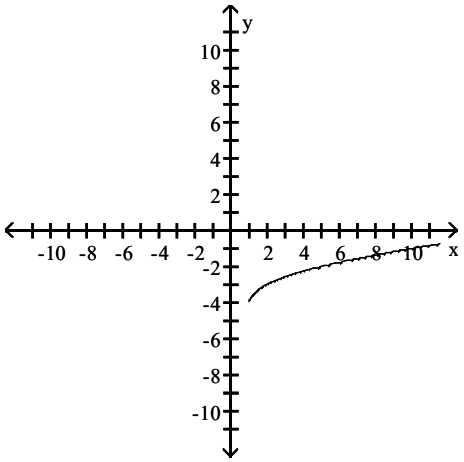
112) $f(x) = -\sqrt{-1 - x} - 4$



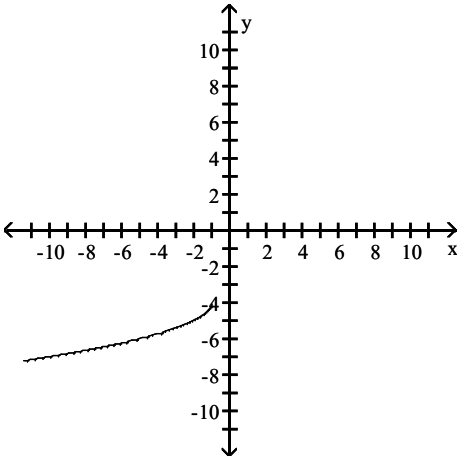
A)



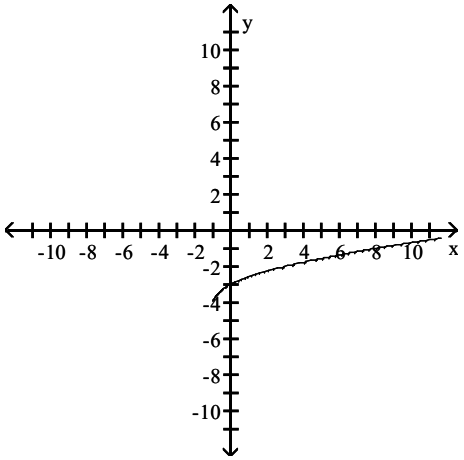
B)



C)



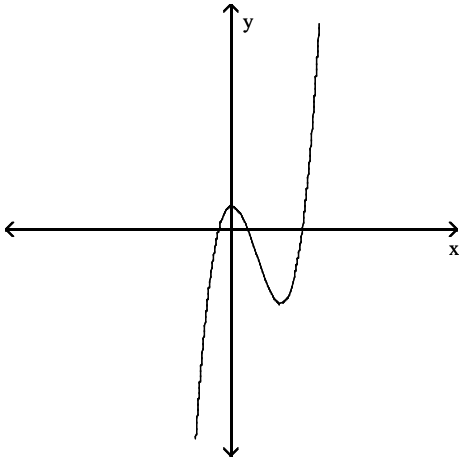
D)



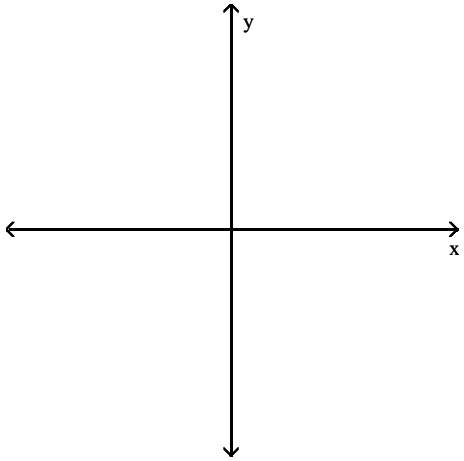
Answer: C

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

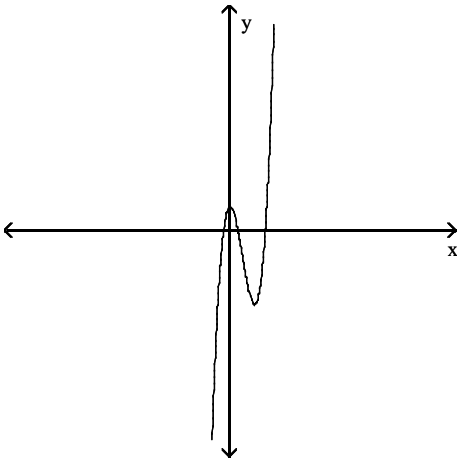
113) y = f(ax), where a satisfies 0 < a < 1



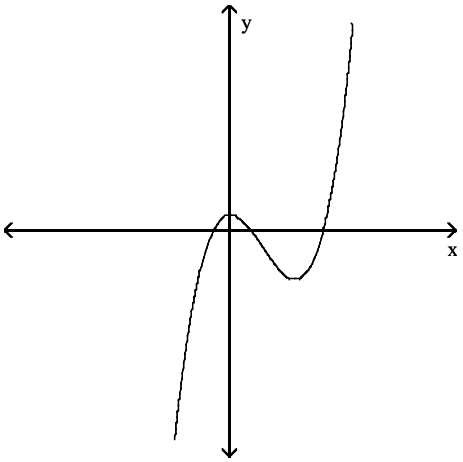
A)



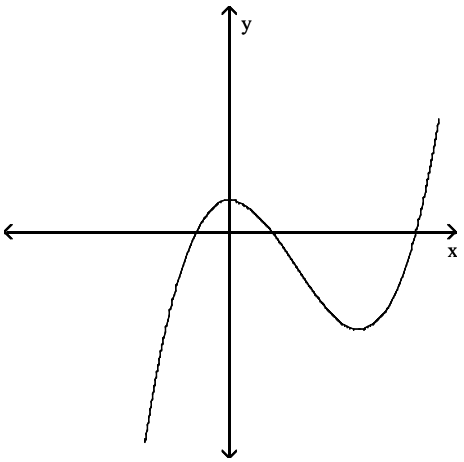
B)



C)

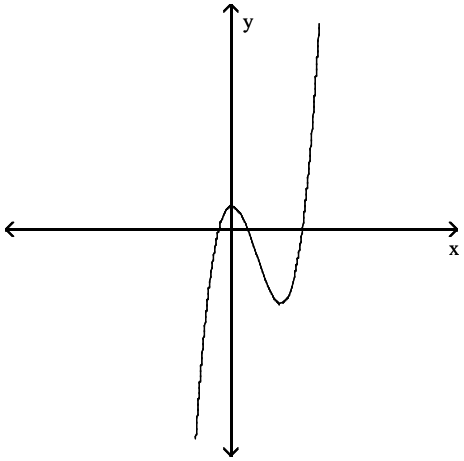


D)

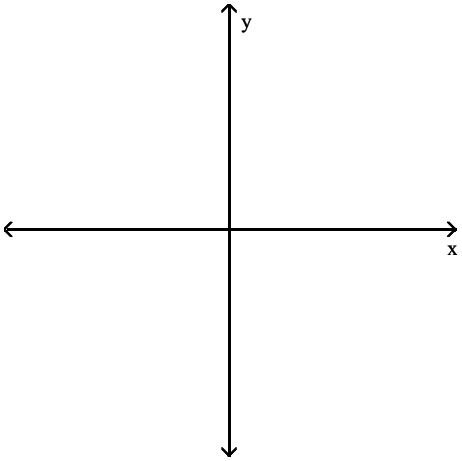


Answer: C

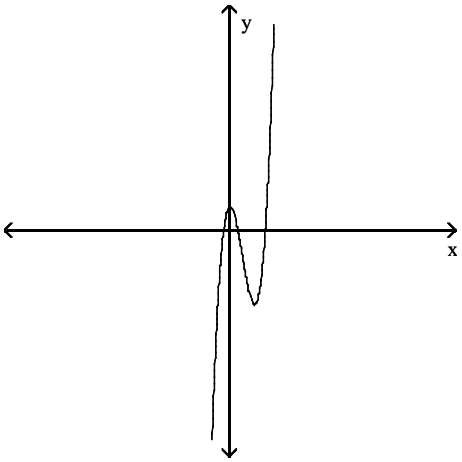
114) y = f(ax), where a satisfies 1 < a



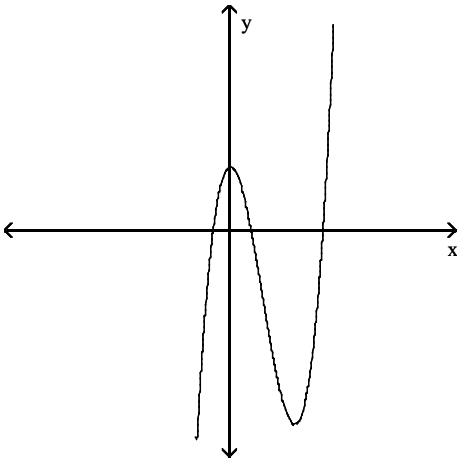
A)



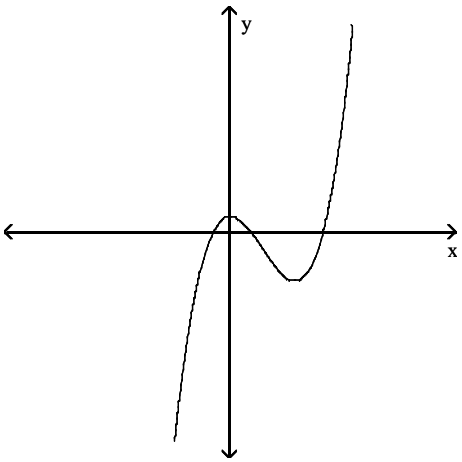
B)



C)

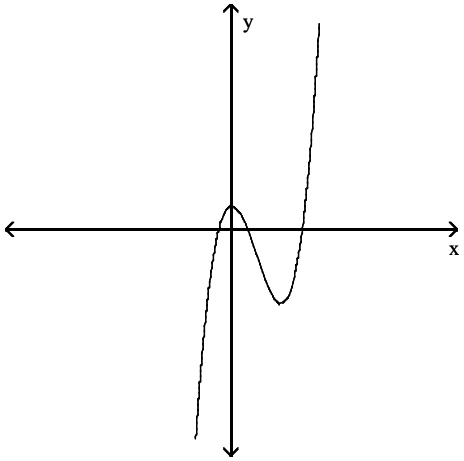


D)

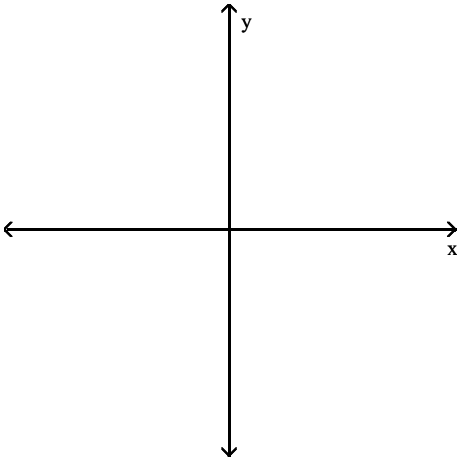


Answer: A

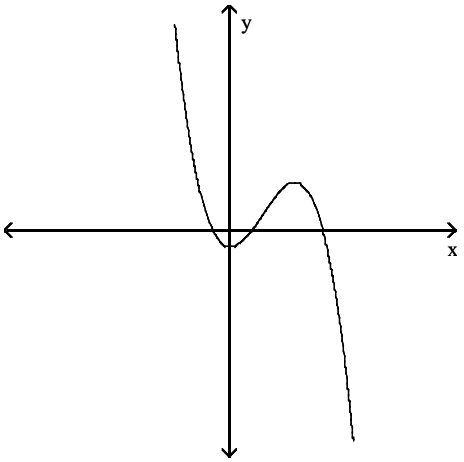
115) y = f(ax), where a satisfies –1 < a < 0



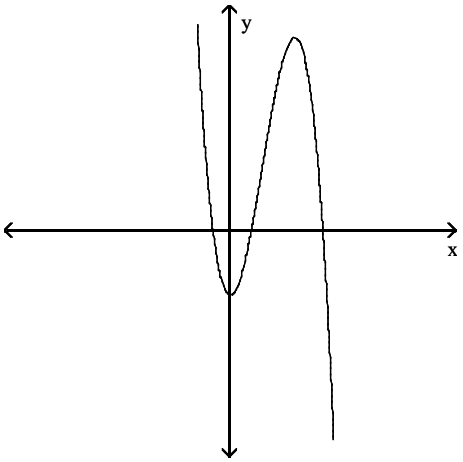
A)



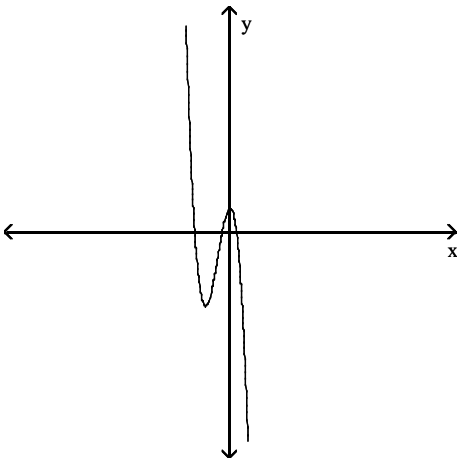
B)

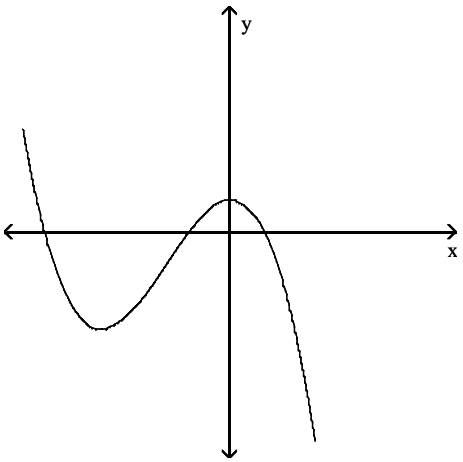


C)



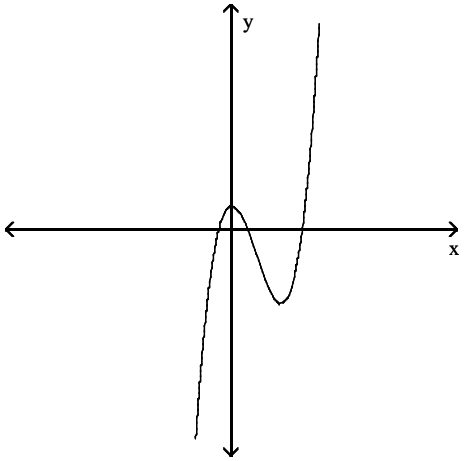
D)



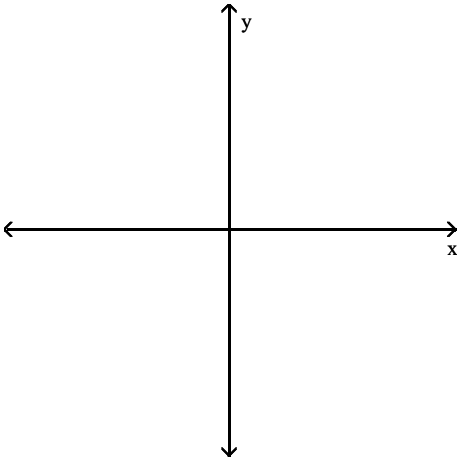


Answer: D

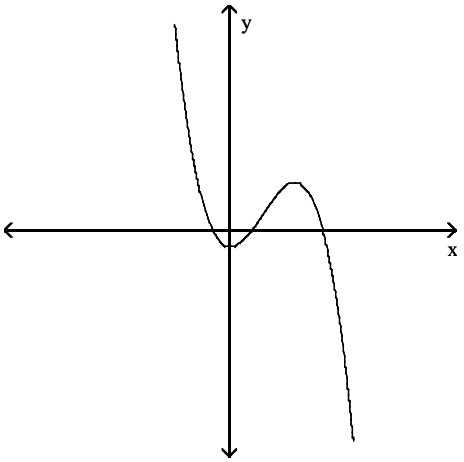
116) y = f(ax), where a satisfies a < –1



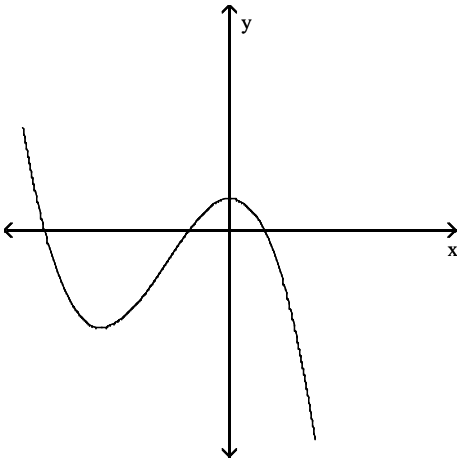
A)



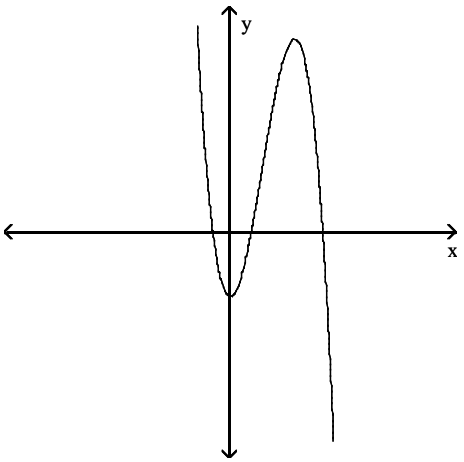
B)



C)

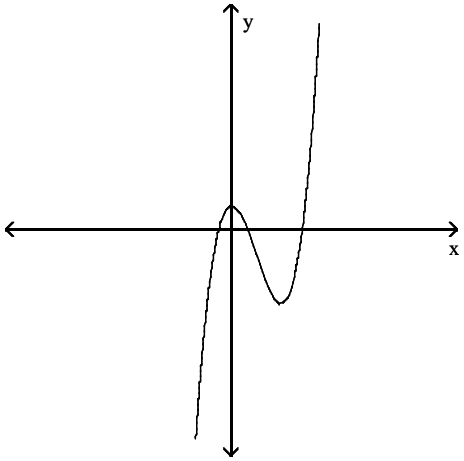


D)

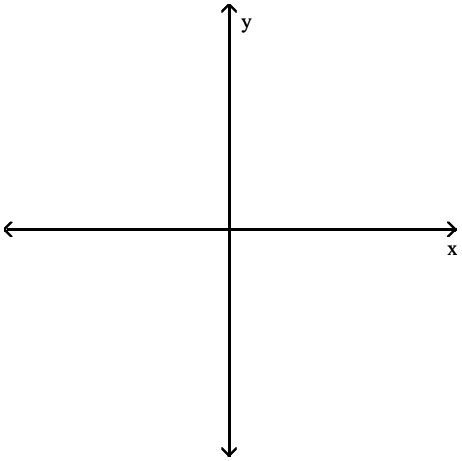


Answer: D

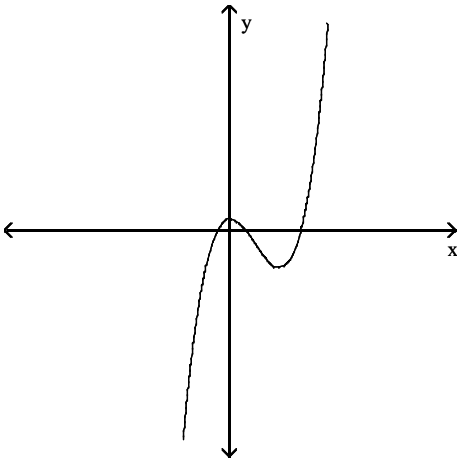
117) y = af(x), where a satisfies 0 < a < 1



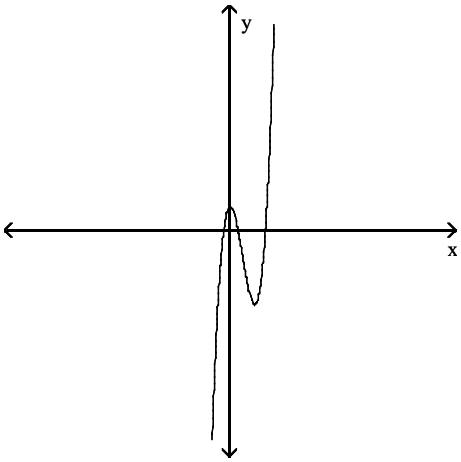
A)



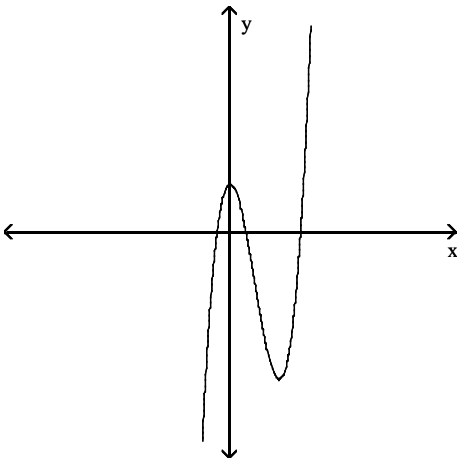
B)



C)

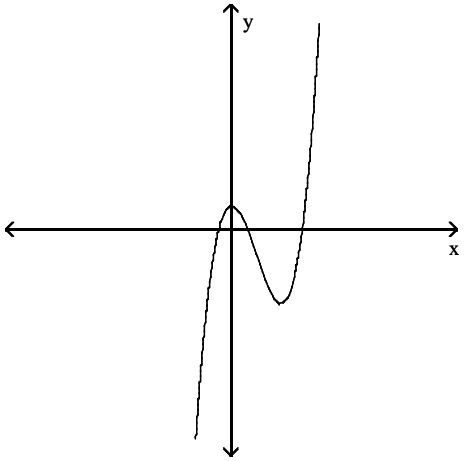


D)

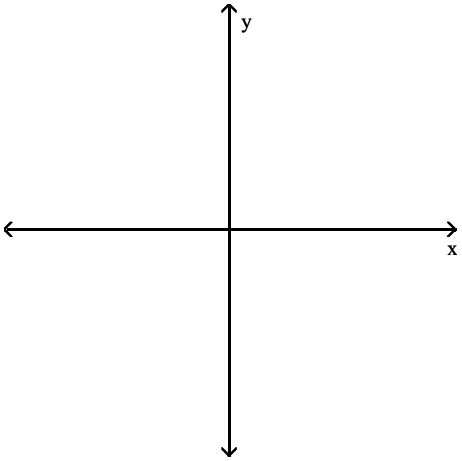


Answer: A

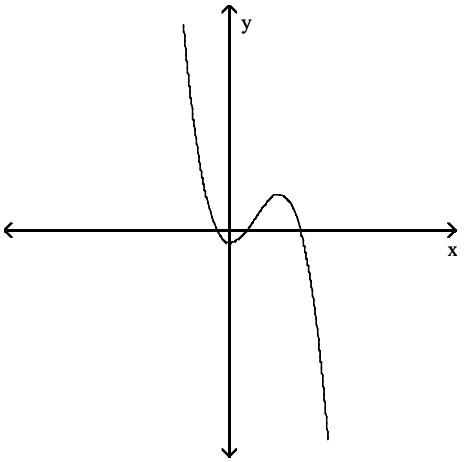
118) y = af(x), where a satisfies 1 < a



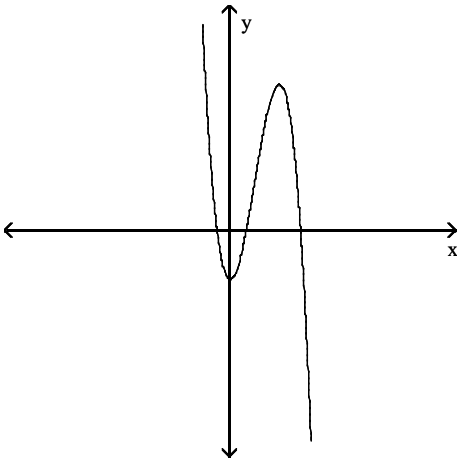
A)



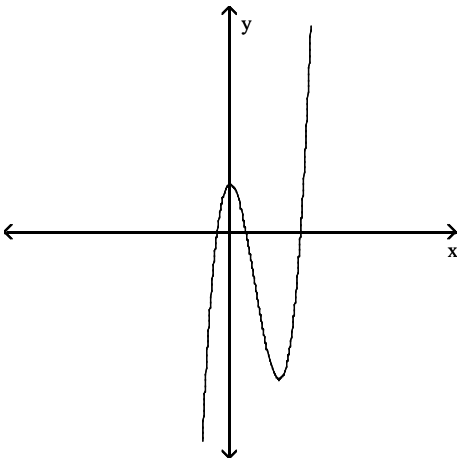
B)



C)



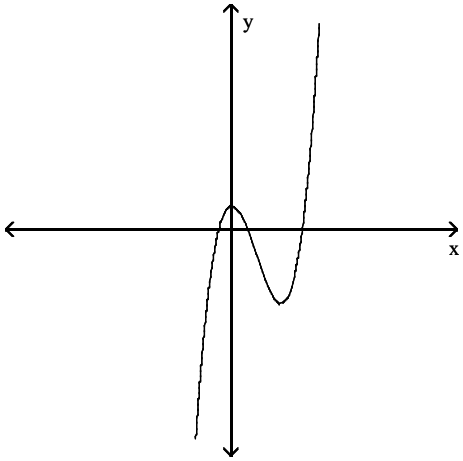
D)



Answer: C

119) y = af(x), where a satisfies –1 < a < 0

A)



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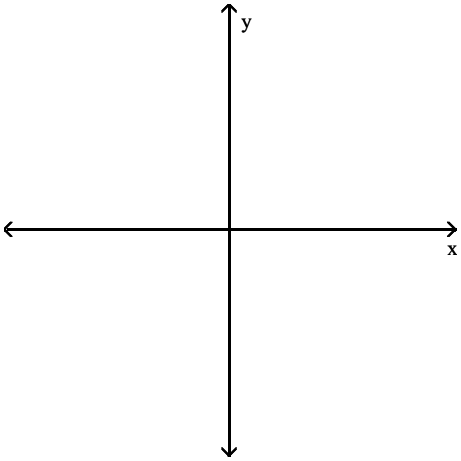
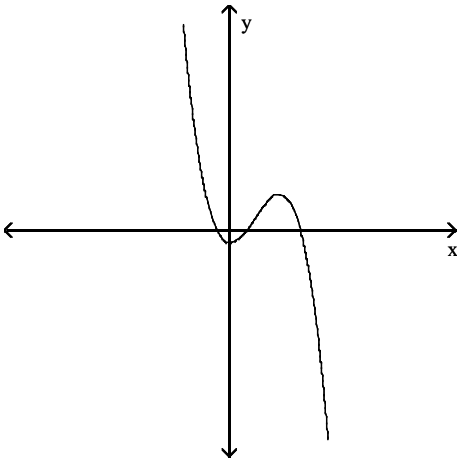
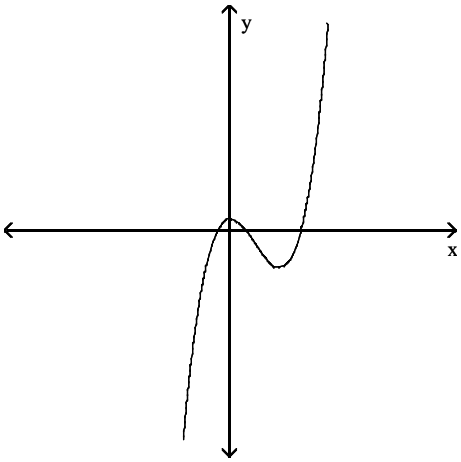
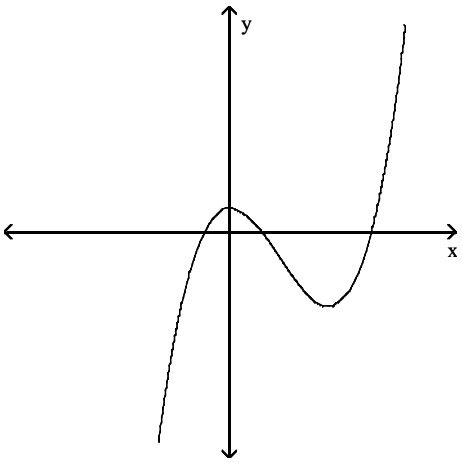


C)



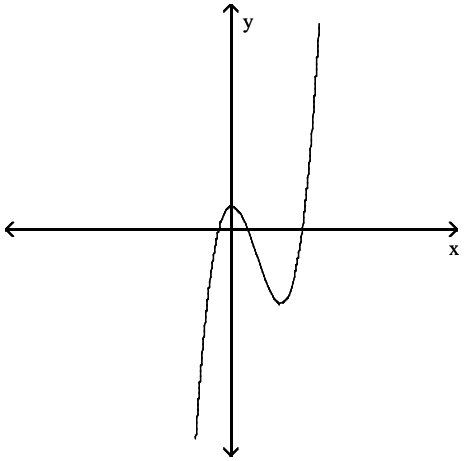
D)



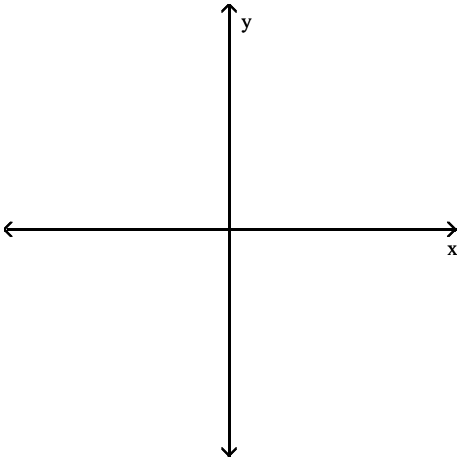


Answer: A

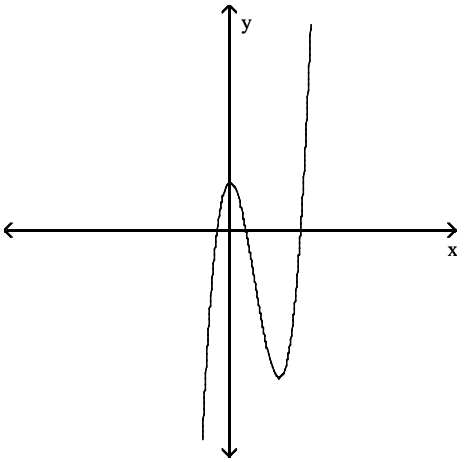
120) y = af(x), where a satisfies a < –1



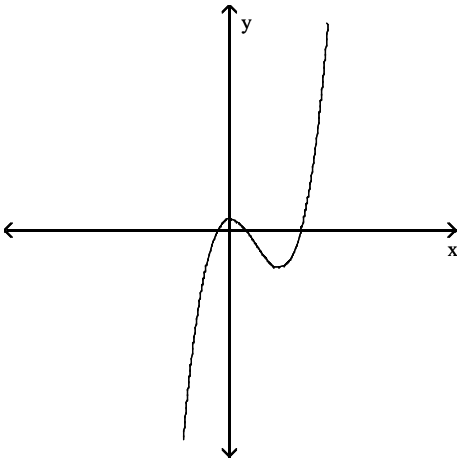
A)



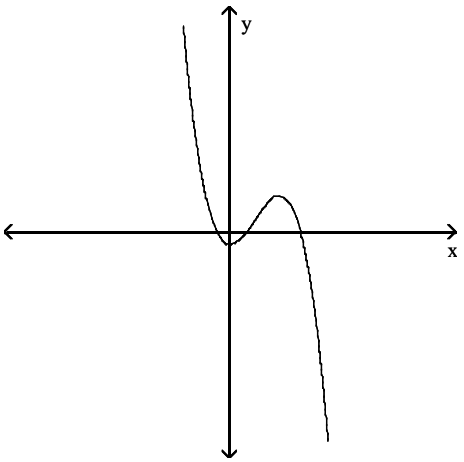
B)



C)



D)



Answer: D

Solve the problem.

121) John owns a hotdog stand. He has found that his profit is represented by the equation $P(x) = -x^2 + 76x + 85$, where is x the number of hotdogs. How many hotdogs must he sell to earn the most profit?

A) 76 hotdogs B) 85 hotdogs C) 38 hotdogs D) 47 hotdogs

Answer: C

122) Bob owns a watch repair shop. He has found that the cost of operating his shop is given by $C(x) = 2x^2 - 120x + 85$, where x is the number of watches repaired. How many watches should he repair to produce the lowest cost?
A) 60 watches B) 30 watches C) 170 watches D) 85 watches
Answer: B

123) John owns a hotdog stand. He has found that his profit is represented by the equation $P(x) = -x^2 + 12x + 42$, where x is the number of hotdogs. What is the most he can earn?
A) $42 B) $78 C) $21 D) $12
Answer: B

124) Bob owns a watch repair shop. He has found that the cost of operating his shop is given by $C(x) = 2x^2 - 40x + 280$, where x is the number of watches repaired. What is his minimum cost?
A) $80 B) $260 C) $160 D) $130
Answer: A

125) Suppose the cost of producing x items is given by $C(x) = 4800 - x^3$ and the revenue made on the sale of x items is $R(x) = 400x - 12x^2$. Find the number of items which serves as a break–even point.
A) 12 items B) 120 items C) 36 items D) 6 items
Answer: A

126) Let $C(x) = 11x + 7$ be the cost to produce x units of a product, and let $R(x) = -x^2 + 19x$ be the revenue. Find the maximum profit.
A) $9 B) $4 C) $12 D) $7
Answer: A

127) 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 $P(x) = -\frac{1}{4}(x - 9)^2 + 30$. How much should the Holt Company spend on advertising to maximize the profit?
A) $9000 B) $30,000 C) $7000 D) $33,000
Answer: A

128) A projectile is thrown upward so that its distance above the ground, in feet, after t seconds is $h = -14t^2 + 364t$. After how many seconds does it reach its maximum height?
A) 28 sec B) 13 sec C) 26 sec D) 14 sec
Answer: B

129) 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?
A) 3 sec B) 6 sec C) 10 sec D) 20 sec
Answer: B

130) The length and width of a rectangle have a sum of 172. What dimensions will give the maximum area?
A) 43 by 129 B) 85 by 87 C) 43 by 43 D) 86 by 86
Answer: D

131) A projectile is thrown upward so that its distance above the ground, in feet, after t seconds is $h = -15t^2 + 480t$. What is its maximum height?

A) 2880 ft B) 1920 ft C) 5760 ft D) 3840 ft

Answer: D

132) If an object is thrown upward with an initial velocity of 11 feet per second, then its height is given by $h = -11t^2 + 88t$. What is its maximum height?

A) 132 ft B) 88 ft C) 176 ft D) 264 ft

Answer: C

133) The number of mosquitoes M(x), in millions, in a certain area depends on the June rainfall x, in inches: $M(x) = 15x - x^2$. What rainfall produces the maximum number of mosquitoes?

A) 7.5 in. B) 225 in. C) 0 in. D) 15 in.

Answer: A

134) A Community College wants to construct a rectangular parking lot on land bordered on one side by a highway. It has 360 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 360 – 2x represent the length.)

A) 120 ft by 240 ft B) 90 ft by 270 ft C) 90 ft by 180 ft D) 120 ft by 120 ft

Answer: C

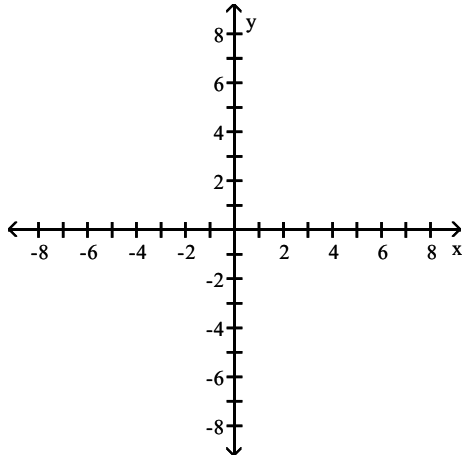
135) What is the maximum area that can be enclosed by 360 feet of fencing?

A) 8100 sq ft B) 16,200 sq ft C) 7200 sq ft D) 14,400 sq ft

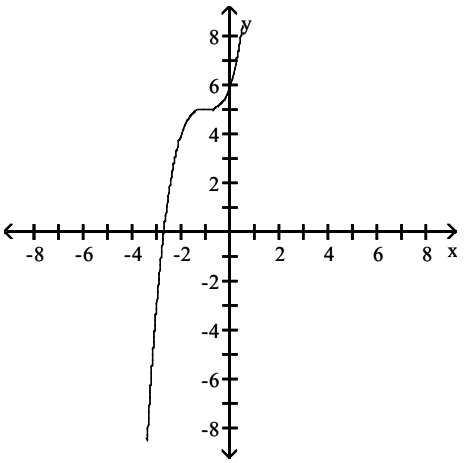
Answer: A

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

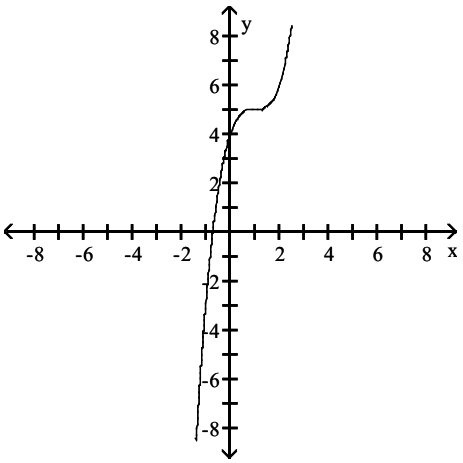
136) $f(x) = (x + 1)^3 - 5$



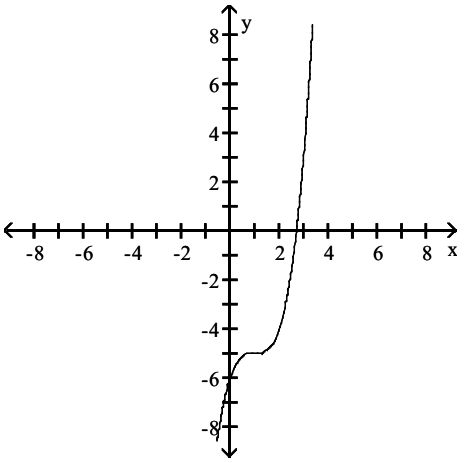
A)



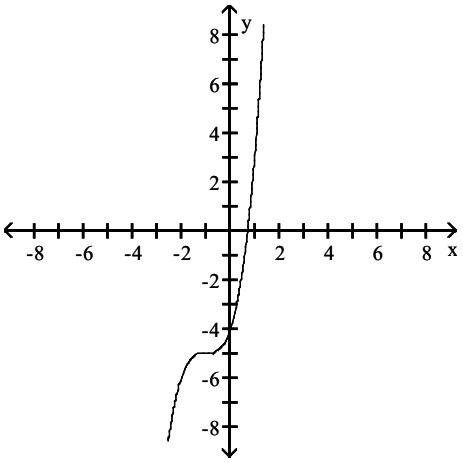
B)



C)

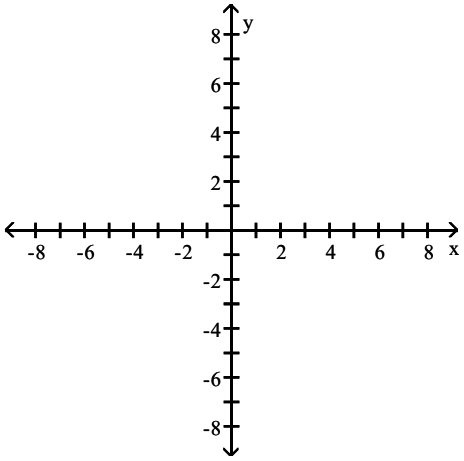


D)

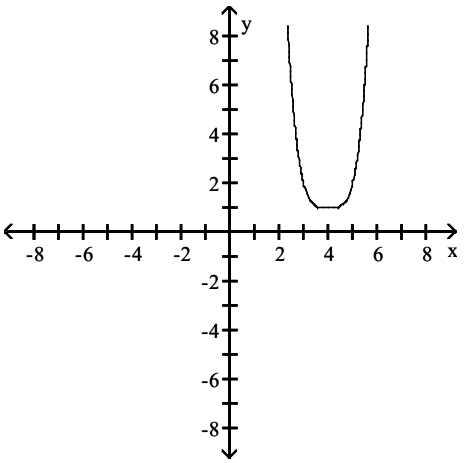


Answer: D

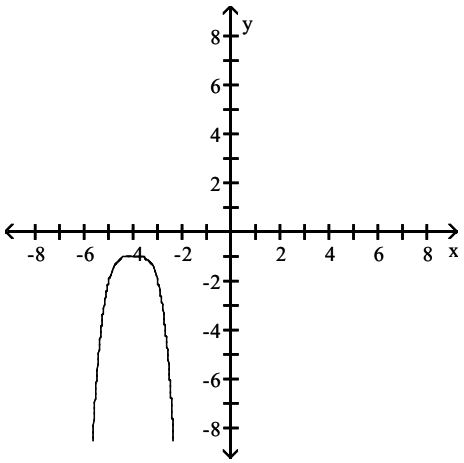
137) $f(x) = -(x + 4)^4 - 1$



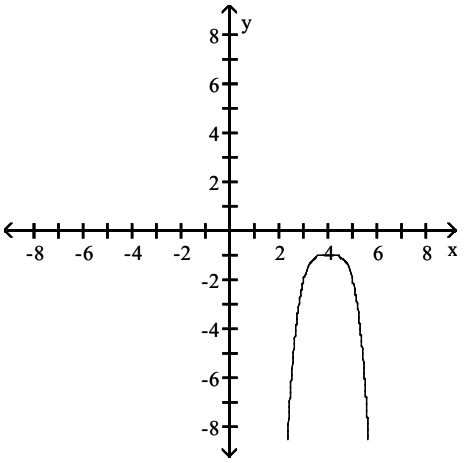
A)



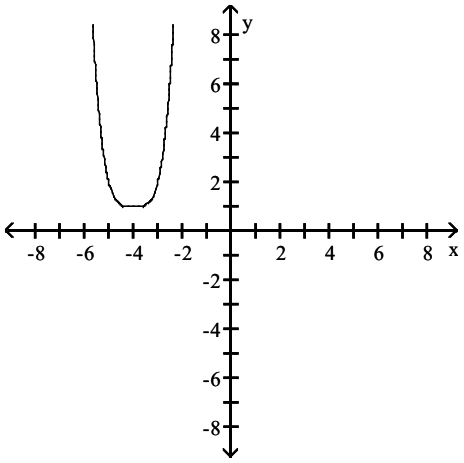
B)



C)



D)

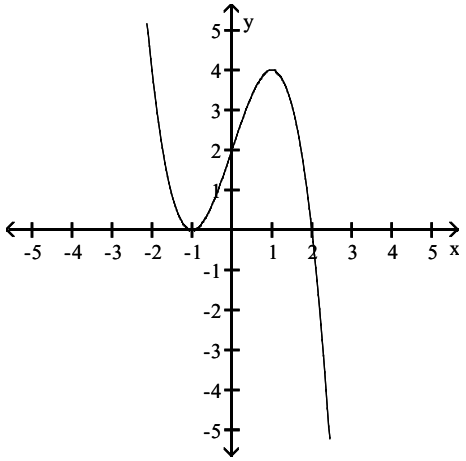


Answer: B

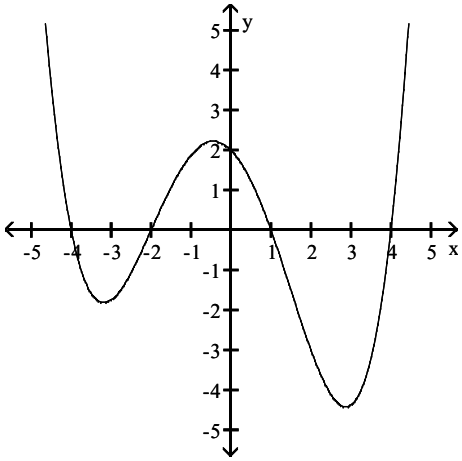
Match the function to the correct graph.

138) $y = x^3 - 3x + 2$

A)



B)



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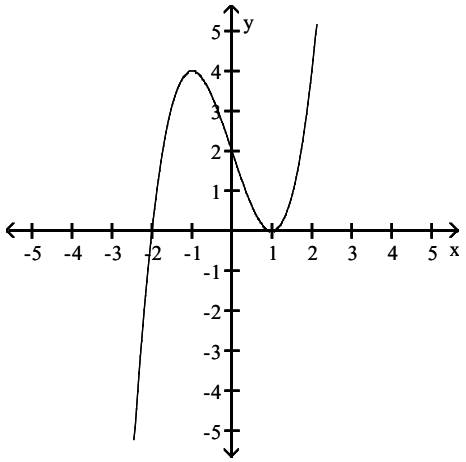
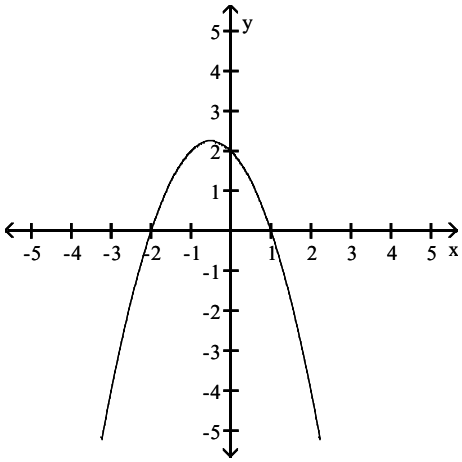


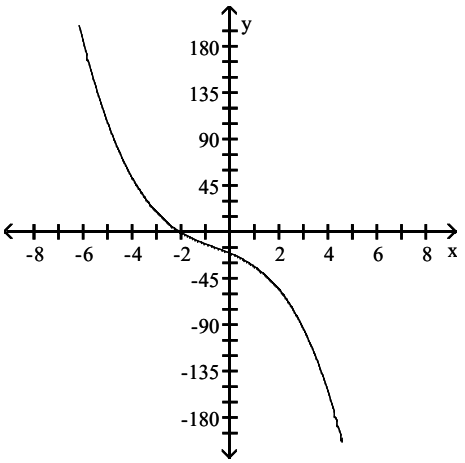
D)



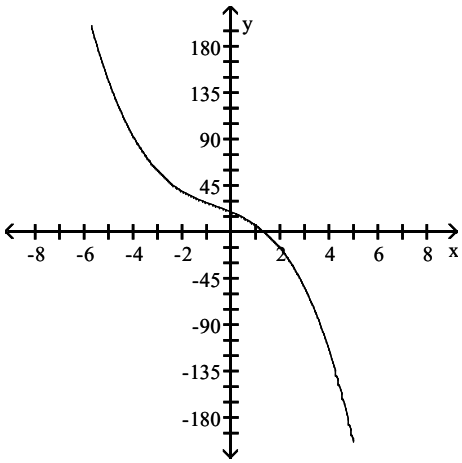
Answer: C

139) $y = -x^3 - 2x^2 - 10x + 20$

A)



B)



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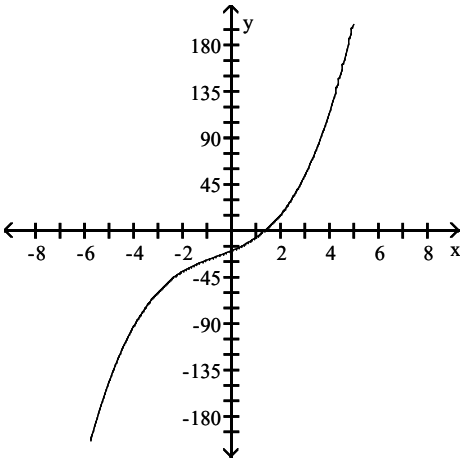
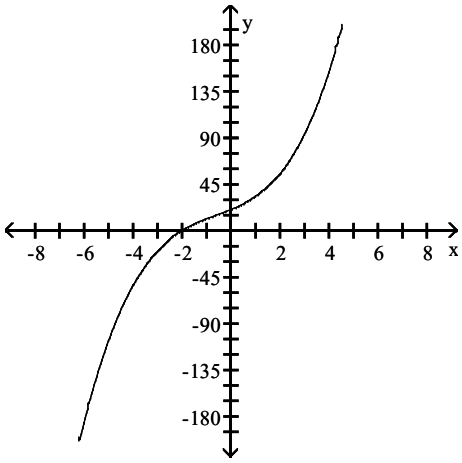


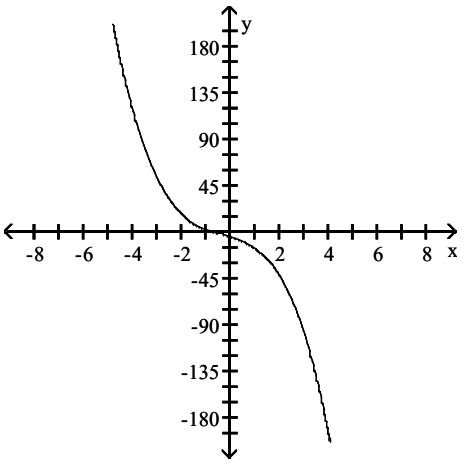
D)



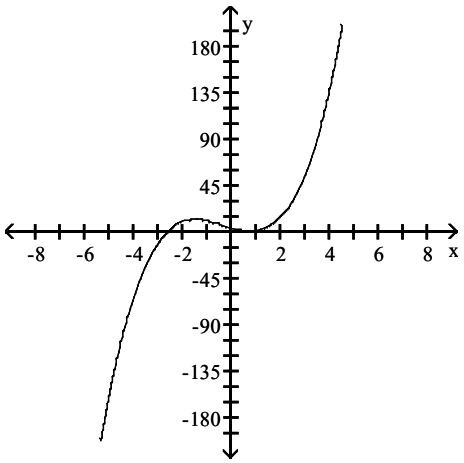
Answer: B

140) $y = 2x^3 + 2x^2 - 7x + 4$

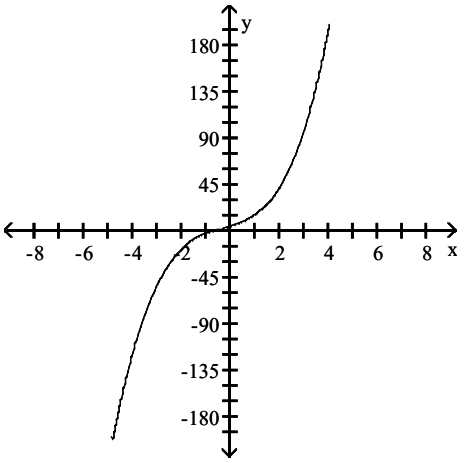
A)



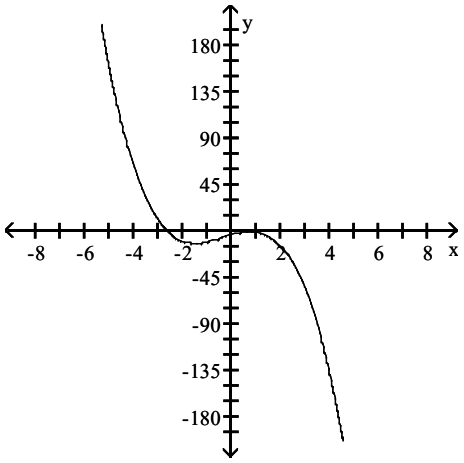
B)



C)



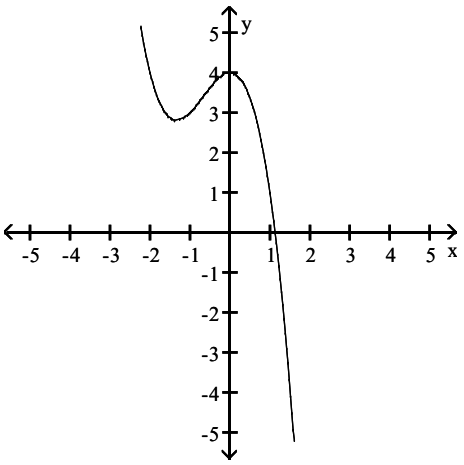
D)



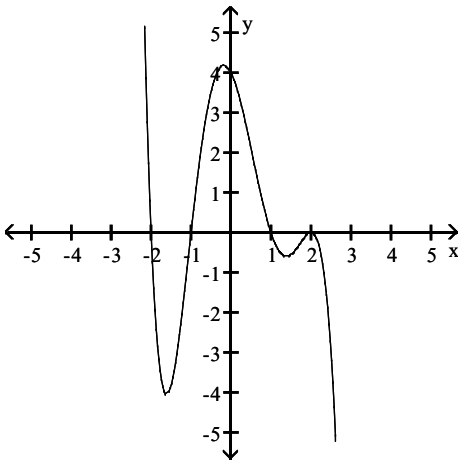
Answer: B

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

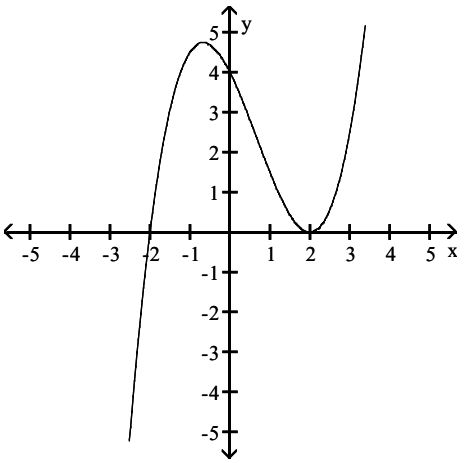
A)



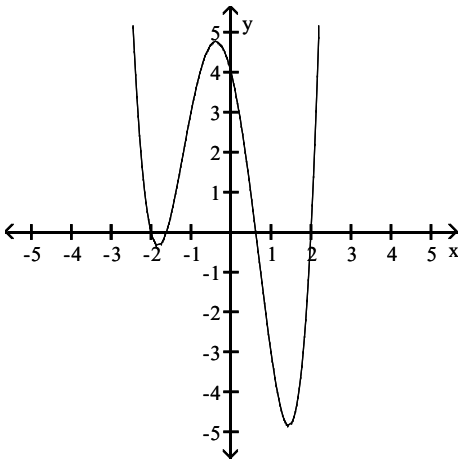
B)



C)



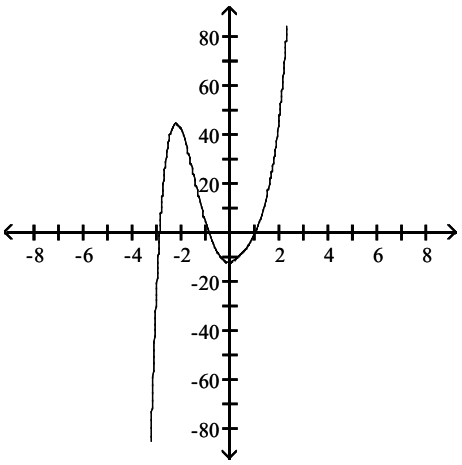
D)



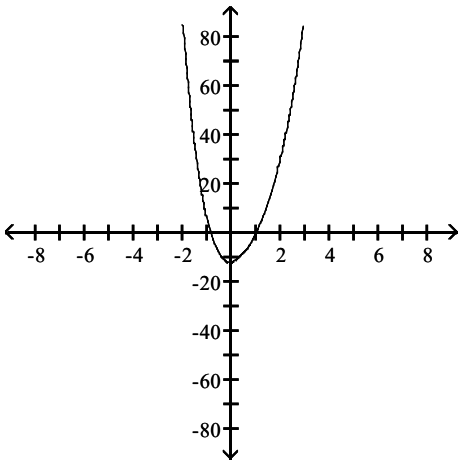
Answer: D

142) $y = x^4 - 4x^3 + 14x^2 + x - 12$

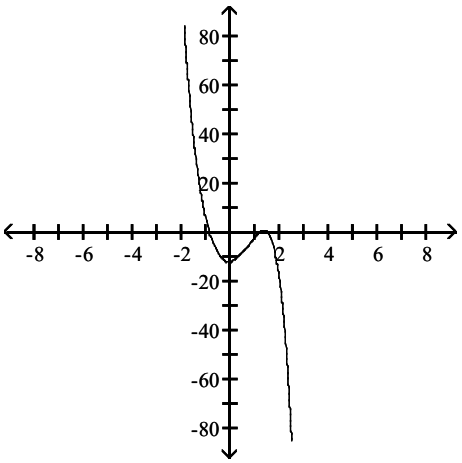
A)



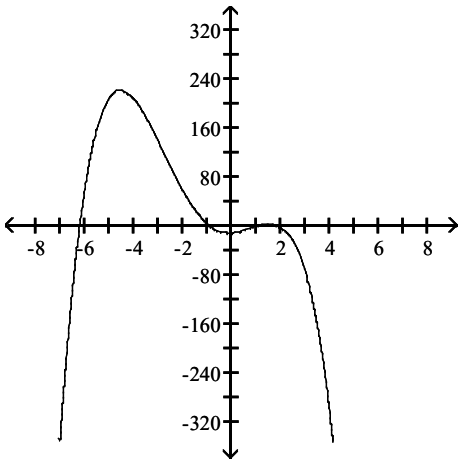
B)



C)



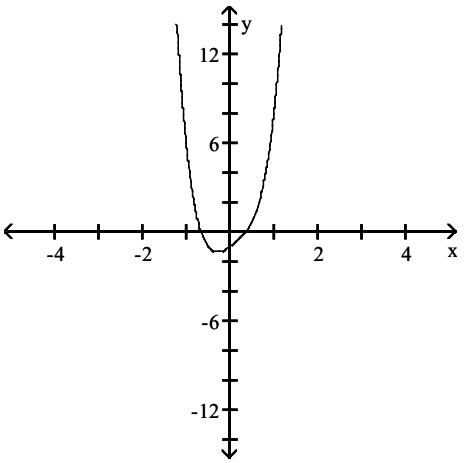
D)



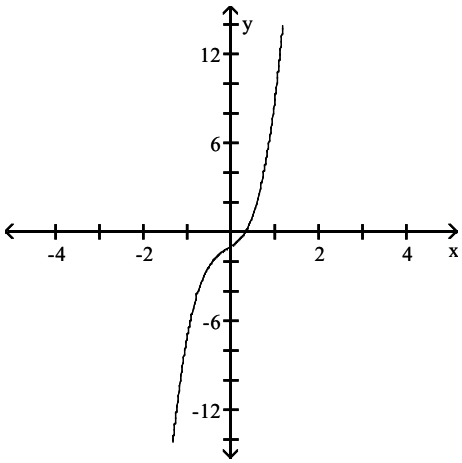
Answer: B

143) $y = 6x^4 - x^3 + 2x^2 + 2x - 1$

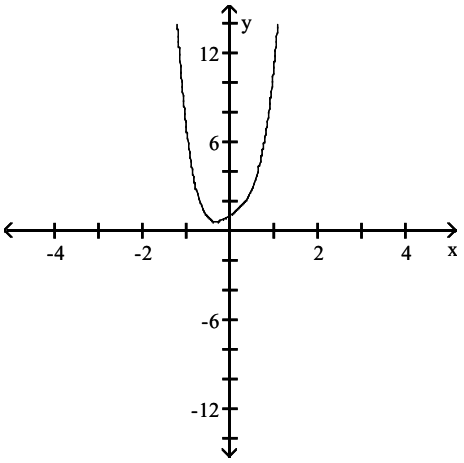
A)



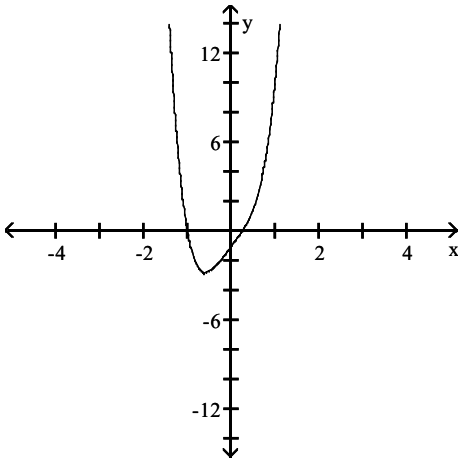
B)



C)



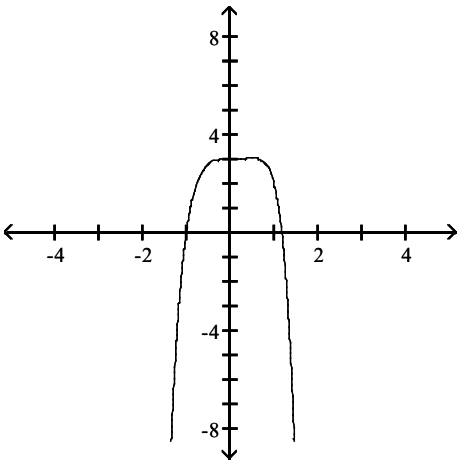
D)



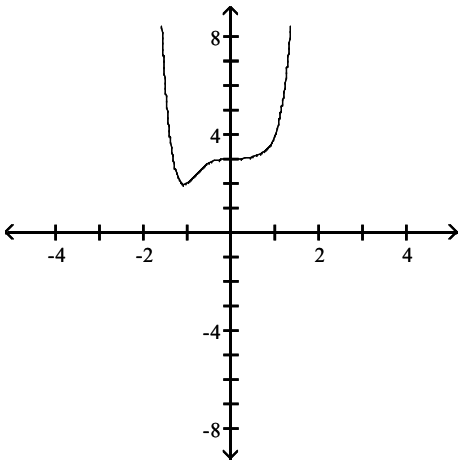
Answer: A

144) $y = x^5 - x^4 + x^3 + 3$

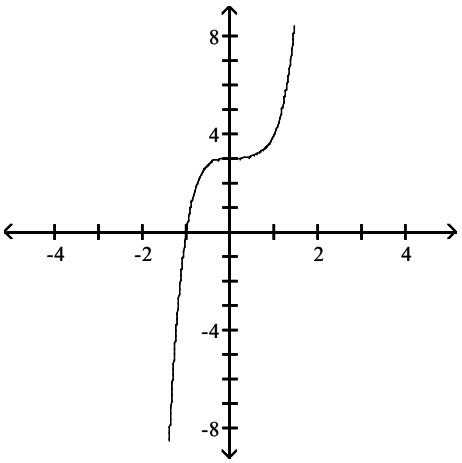
A)



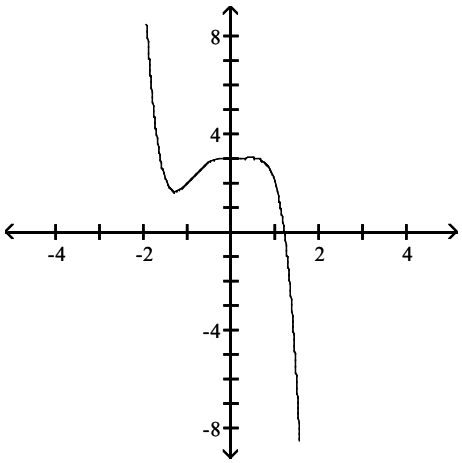
B)



C)



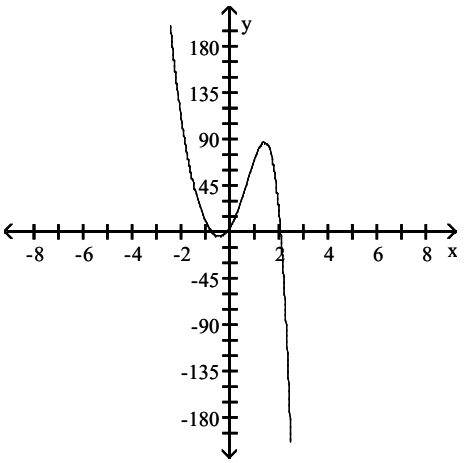
D)



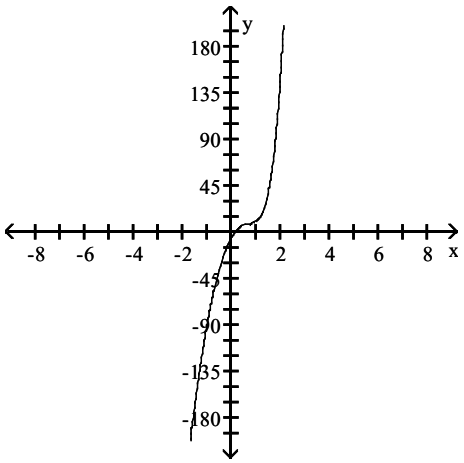
Answer: C

145) $y = 2x^5 + 7x^4 + 8x^3 - 43x^2 - 41x - 5$

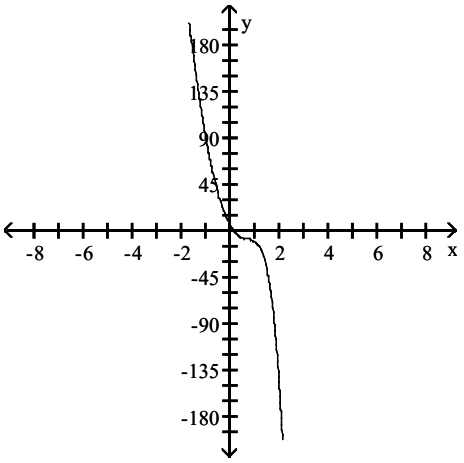
A)



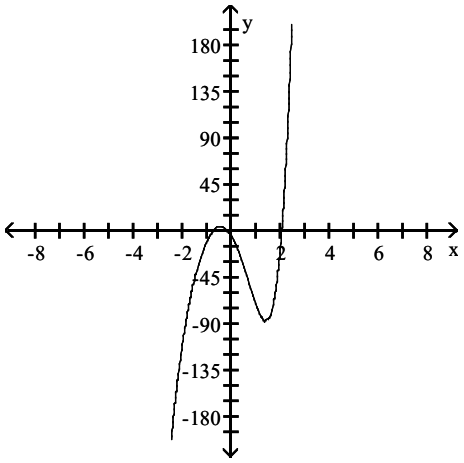
B)



C)



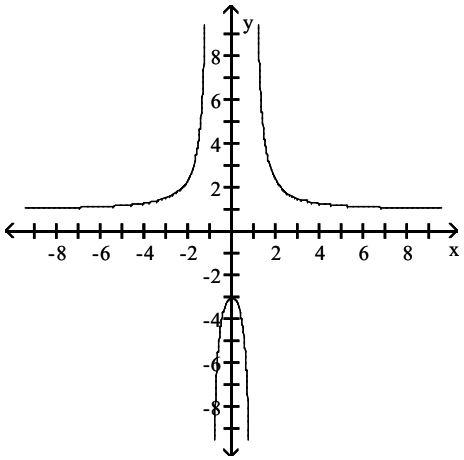
D)



Answer: D

Match the graph to the correct function.

146)



A) $y = \dfrac{x^2 - 3}{x^2 + 1}$

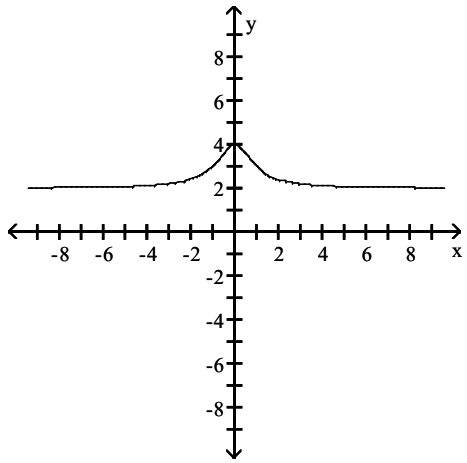
B) $y = \dfrac{x^2 + 3}{x^2 - 1}$

C) $y = \dfrac{x}{x^2 - 1}$

D) $y = \dfrac{x^2 + 3}{x^3 - 1}$

Answer: B

147)

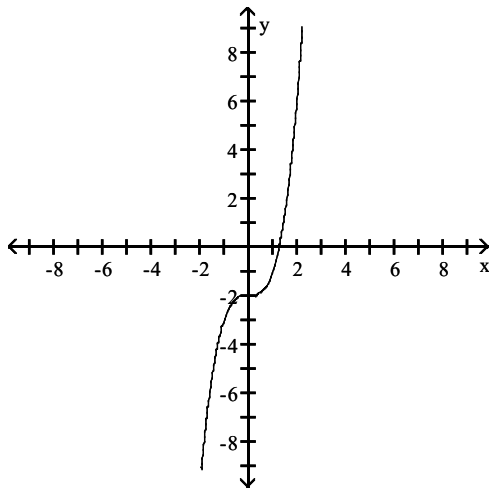


A) $y = \frac{2x^2 + 4}{x^2 + 1}$ B) $y = \frac{2x^2 - 4}{x^2 - 1}$ C) $y = \frac{-2x^2 - 4}{x^2 - 1}$ D) $y = \frac{-2x^2 + 4}{x^2 + 1}$

Answer: A

The following is a graph of a polynomial function. State whether the degree of the polynomial is even or odd, and give the sign (+ or –) for the leading coefficient.

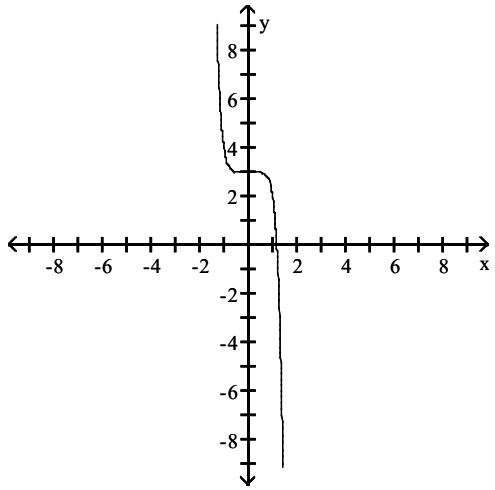
148)



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

Answer: D

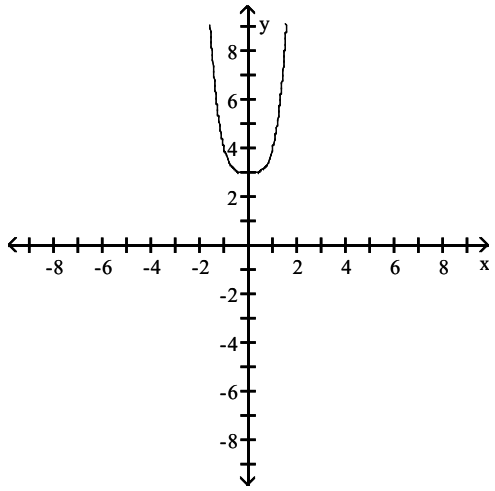
149)



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

Answer: B

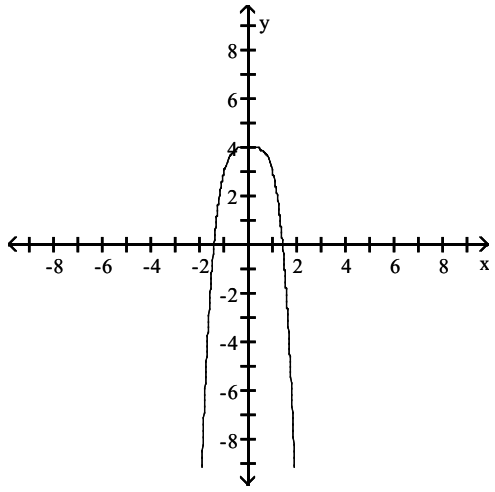
150)



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

Answer: A

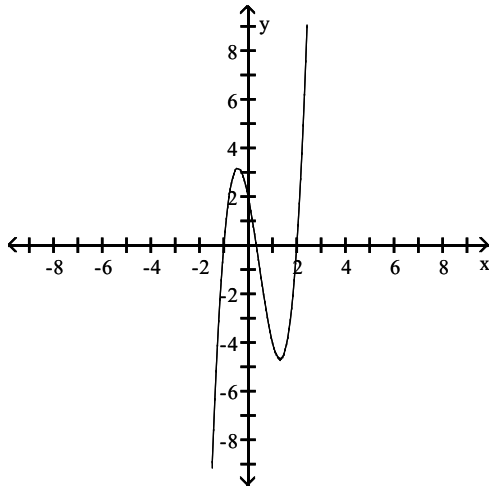
151)



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

Answer: D

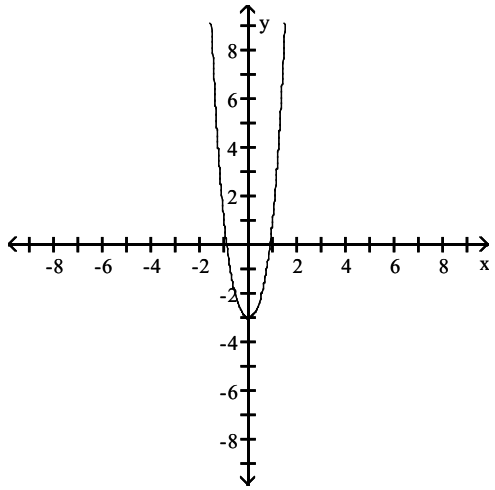
152)



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

Answer: D

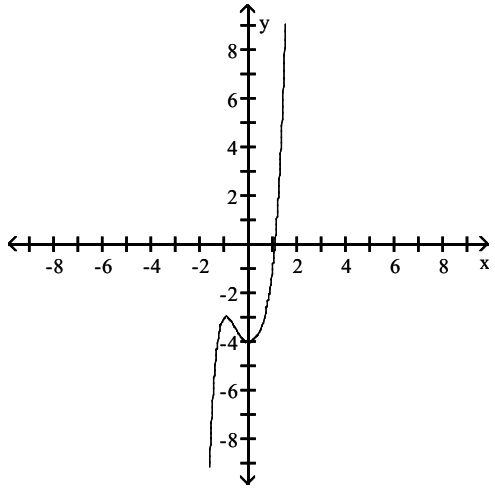
153)



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

Answer: B

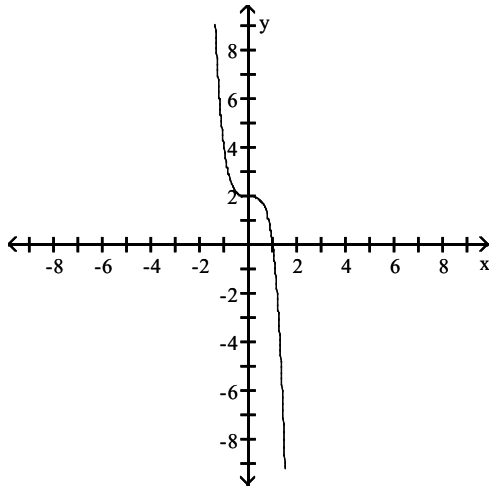
154)



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

Answer: B

155)



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

Answer: D

Find the asymptotes of the function.

156) $y = \frac{5}{x - 7}$

A) Vertical asymptote at $x = 7$; horizontal asymptote at $y = 0$
B) Vertical asymptote at $x = -7$; no horizontal asymptote
C) Vertical asymptote at $x = 7$; horizontal asymptote at $y = 5$
D) Vertical asymptote at $x = -7$; horizontal asymptote at $y = 0$

Answer: A

157) $y = \frac{-4}{x - 5}$

A) Vertical asymptote at $x = 5$; horizontal asymptote at $y = -4$
B) Vertical asymptote at $x = -5$; horizontal asymptote at $y = -4$
C) Vertical asymptote at $x = 5$; horizontal asymptote at $y = 0$
D) Vertical asymptote at $x = -5$; horizontal asymptote at $y = 0$

Answer: C

158) $y = \frac{4}{3 - 6x}$

A) Vertical asymptote at $x = \frac{1}{2}$; horizontal asymptote at $y = 4$

B) Vertical asymptote at $x = 0$; horizontal asymptote at $y = \frac{1}{2}$

C) Vertical asymptote at $x = \frac{1}{2}$ horizontal asymptote at $y = 0$

D) Vertical asymptote at $x = 4$; horizontal asymptote at $y = \frac{1}{2}$

Answer: C

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

A) Vertical asymptote at $x = 3$; horizontal asymptote at $y = 2$
B) Vertical asymptote at $x = -3$; horizontal asymptote at $y = 2$
C) Vertical asymptote at $x = 3$; no horizontal asymptote
D) Vertical asymptote at $x = 2$; horizontal asymptote at $y = 3$

Answer: A

160) $y = \frac{x + 9}{x - 3}$

A) Vertical asymptote at $x = -3$; horizontal asymptote at $y = 0$
B) Vertical asymptote at $x = 3$; horizontal asymptote at $y = 1$
C) Vertical asymptote at $x = 3$; horizontal asymptote at $y = x$
D) Vertical asymptote at $x = -3$; horizontal asymptote at $y = 1$

Answer: B

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

A) Vertical asymptote at $x = -2$; horizontal asymptote at $y = \frac{1}{2}$
B) Vertical asymptote at $x = -2$; horizontal asymptote at $y = -4$
C) Vertical asymptote at $x = -4$; horizontal asymptote $y = -2$
D) Vertical asymptote at $x = 2$; horizontal asymptote at $y = -4$

Answer: B

162) $y = \frac{-3x + 2}{24 - 6x}$

A) Vertical asymptote at $x = 4$; horizontal asymptote at $y = -\frac{1}{2}$
B) Vertical asymptote at $x = -\frac{1}{2}$; horizontal asymptote at $y = 4$
C) Vertical asymptote at $x = 4$; horizontal asymptote at $y = \frac{1}{2}$
D) Vertical asymptote at $x = 4$; horizontal asymptote at $y = 3$

Answer: C

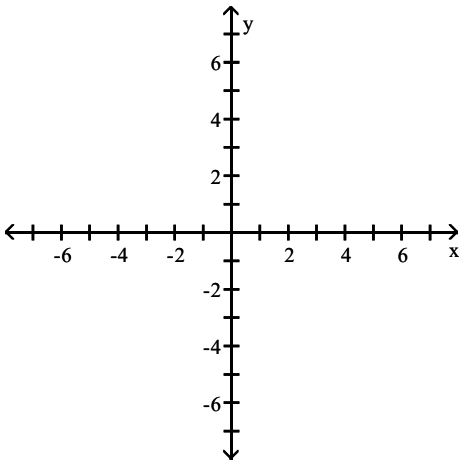
163) $y = \frac{x^2 - 25}{x - 5}$

A) No vertical asymptote; horizontal asymptote at $y = 5$
B) No asymptotes; hole at $x = 5$
C) Vertical asymptote at $x = -5$; no horizontal asymptote
D) Vertical asymptote at $x = 5$; no horizontal asymptote

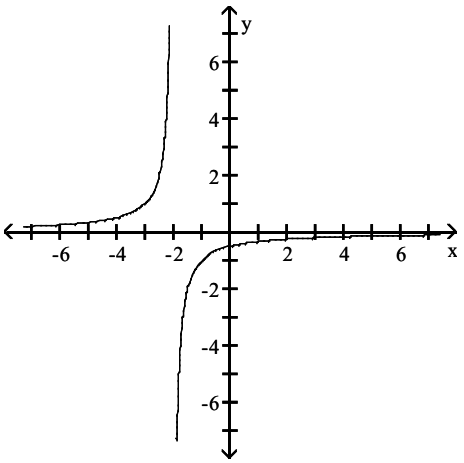
Answer: B

Graph the rational function.

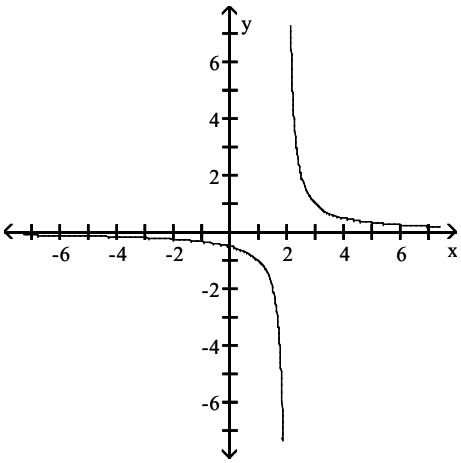
164) $y = \frac{1}{x - 2}$



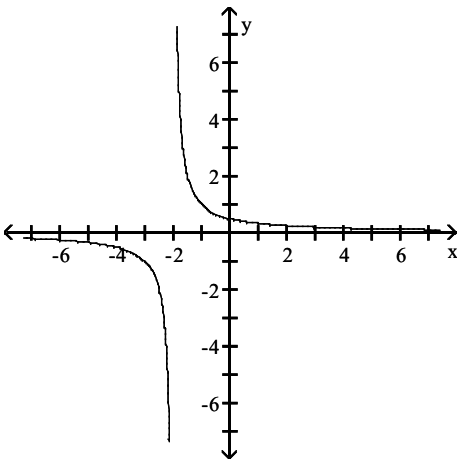
A)



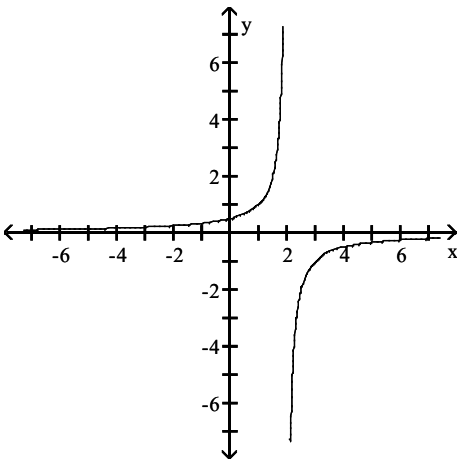
B)



C)

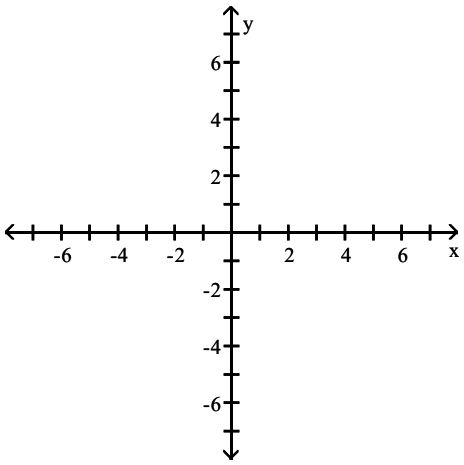


D)

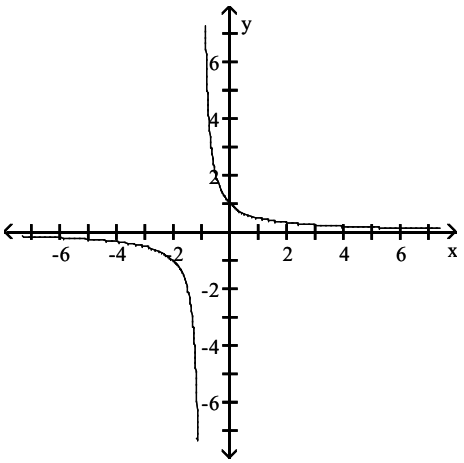


Answer: B

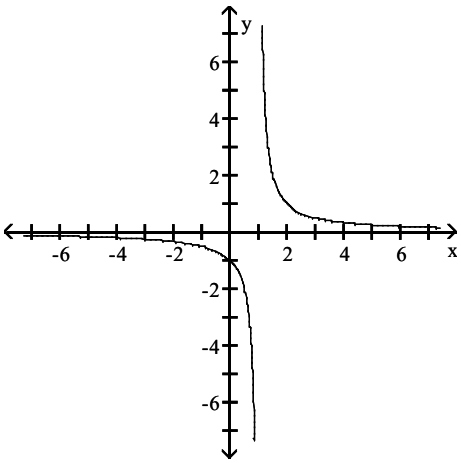
165) $y = \dfrac{-1}{x - 1}$



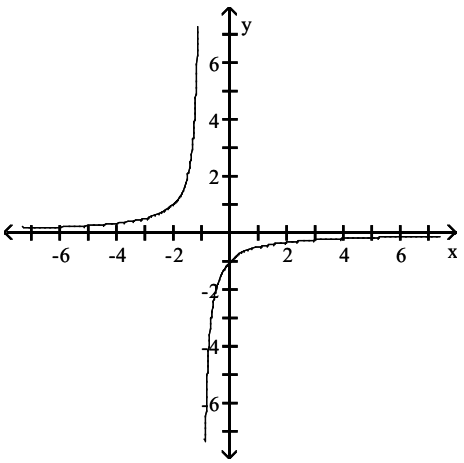
A)



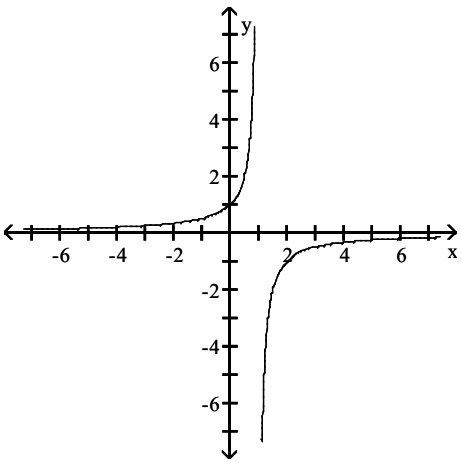
B)



C)

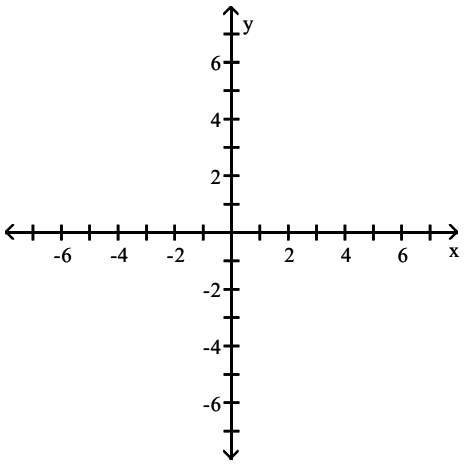


D)

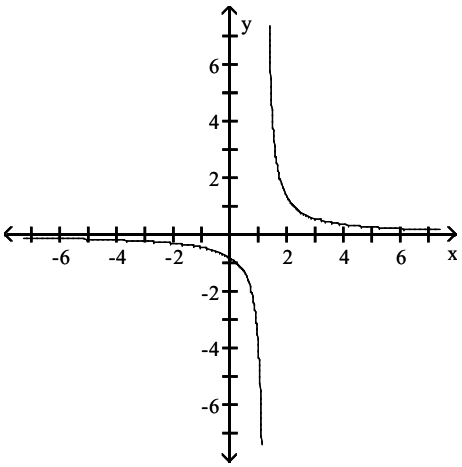


Answer: D

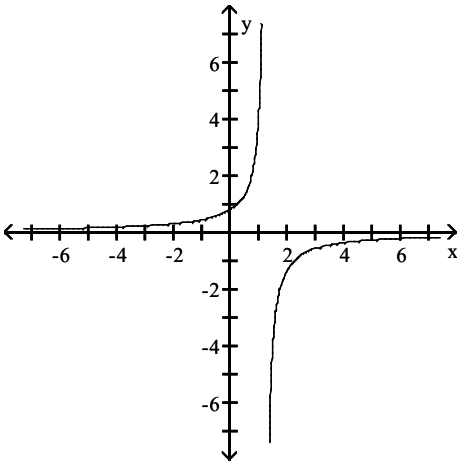
166) $y = \dfrac{4}{5 - 4x}$



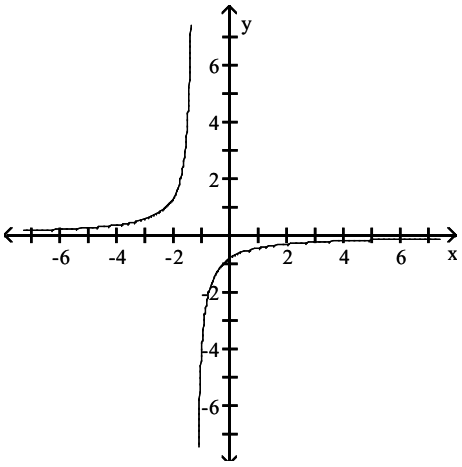
A)



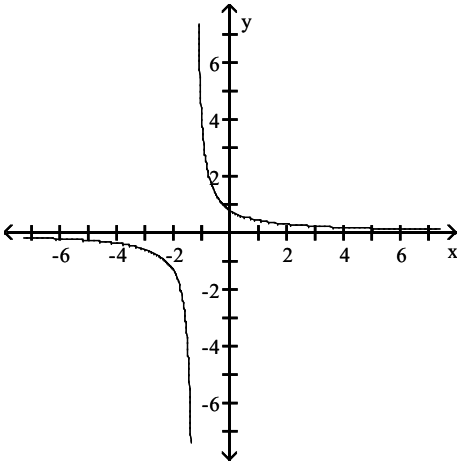
B)



C)

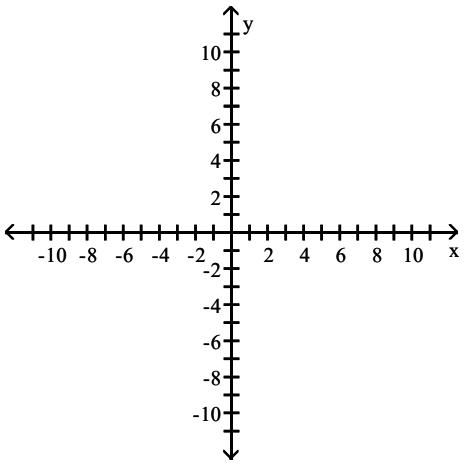


D)

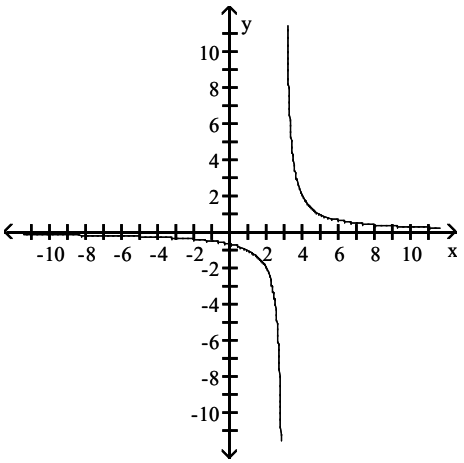


Answer: B

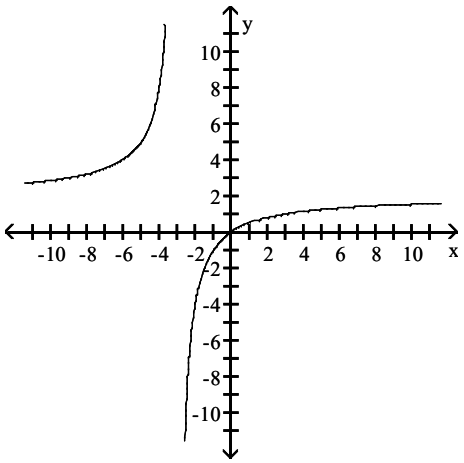
167) $y = \dfrac{2x}{x - 3}$



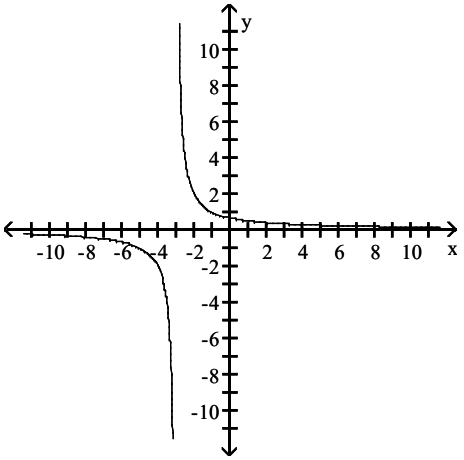
A)



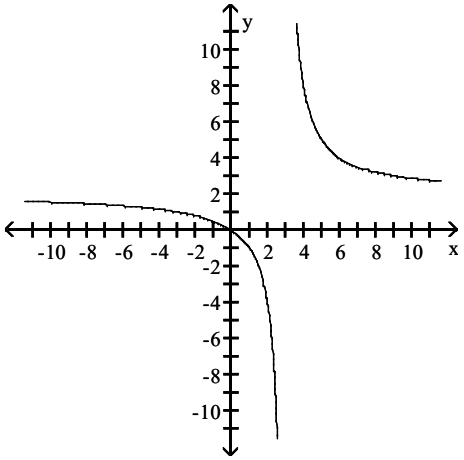
B)



C)

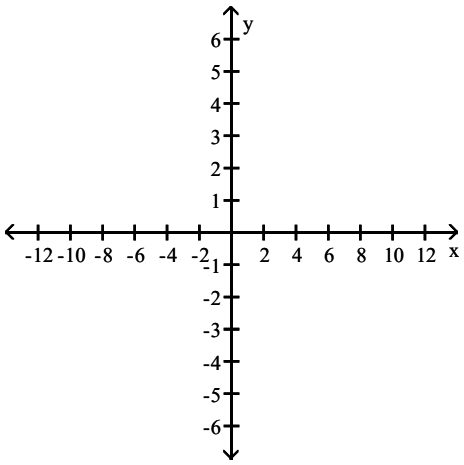


D)

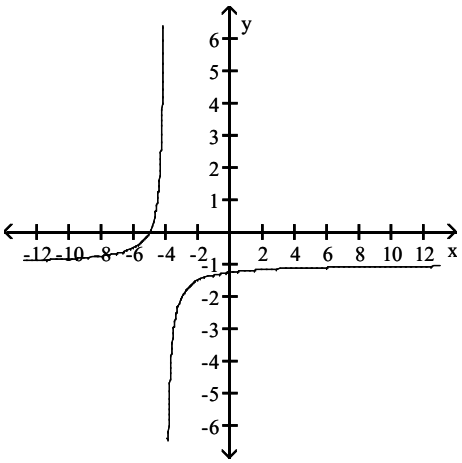


Answer: D

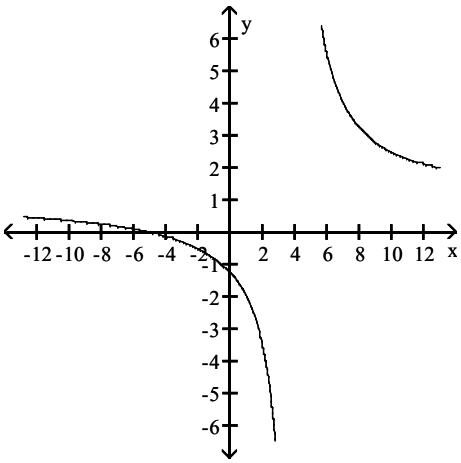
168) $y = \dfrac{x + 5}{x - 4}$



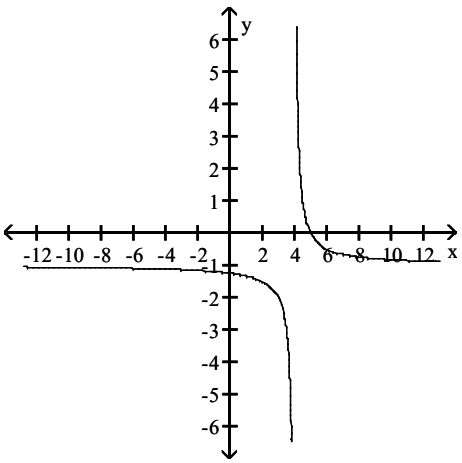
A)



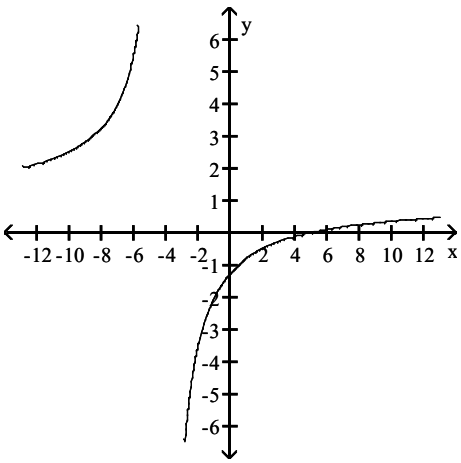
B)



C)

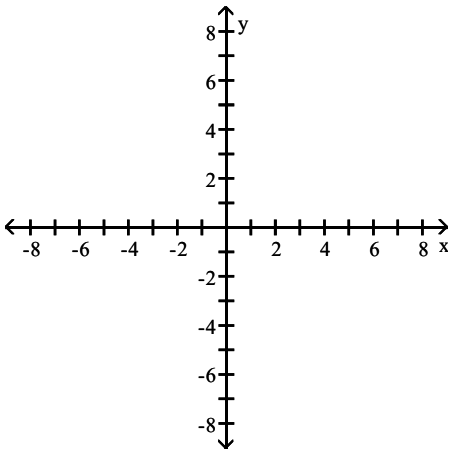


D)

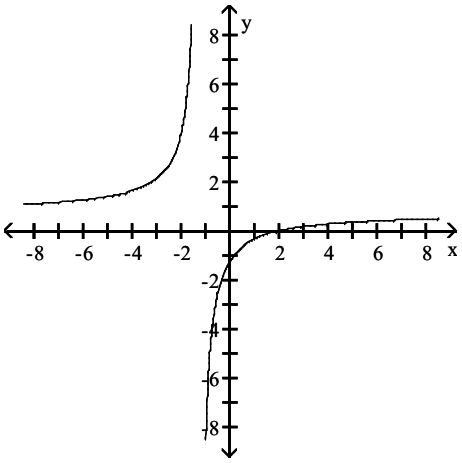


Answer: B

169) $y = \dfrac{-6 - 3x}{4x + 5}$



A)



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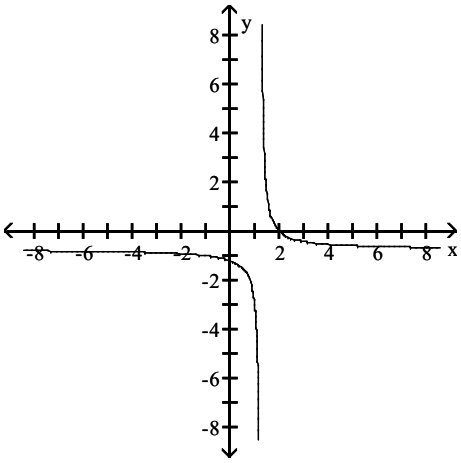
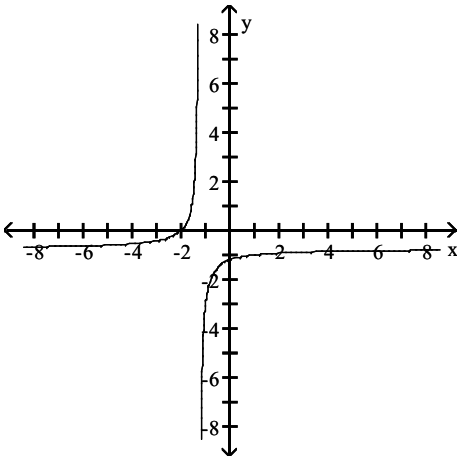
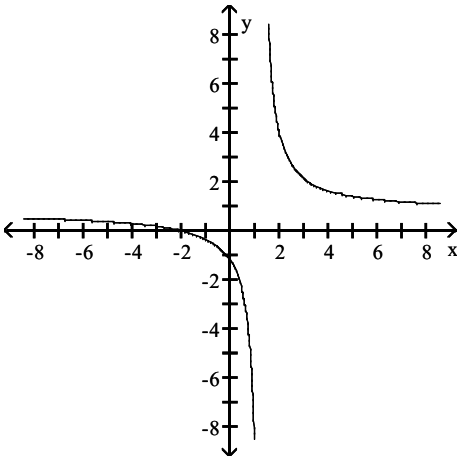


C)

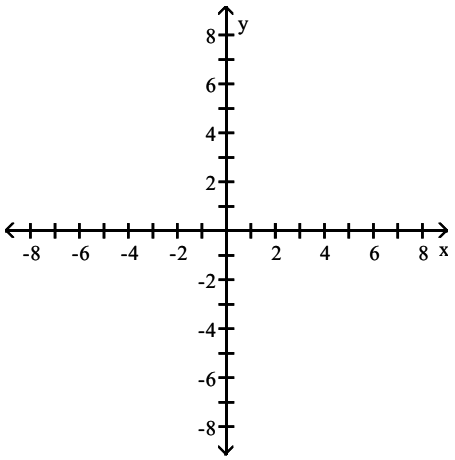


D)

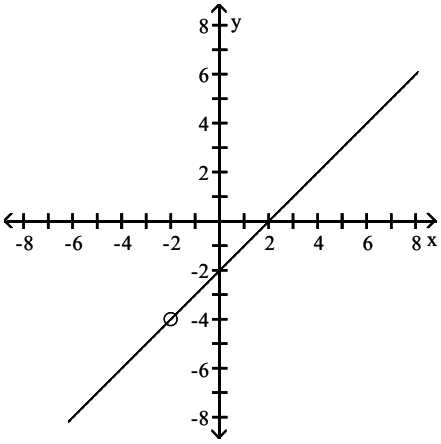


Answer: C

170) $f(x) = \dfrac{x^2 - 4}{x - 2}$



A)



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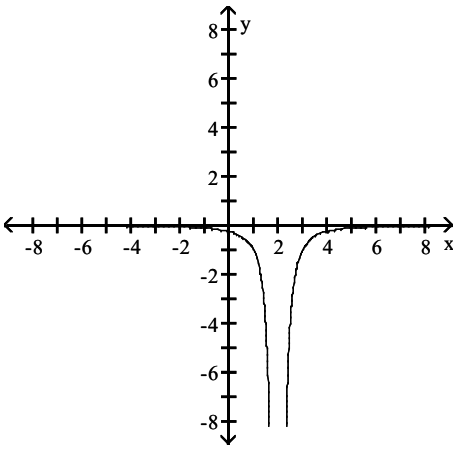
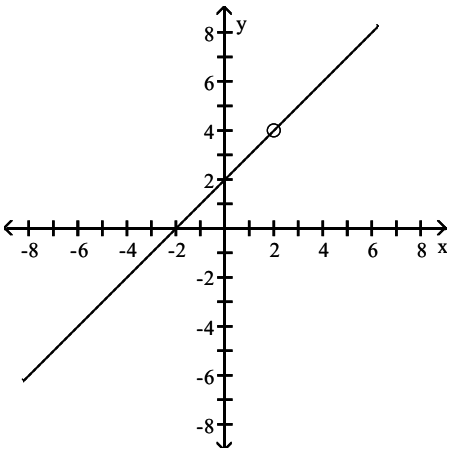
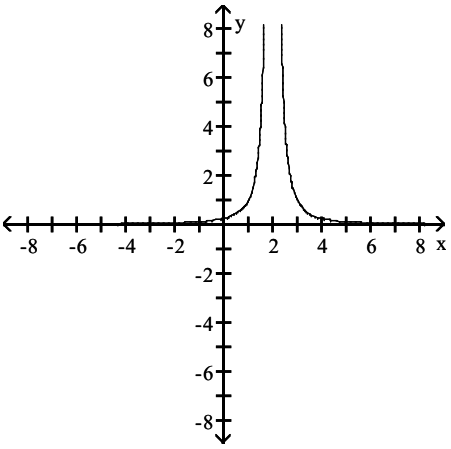


C)

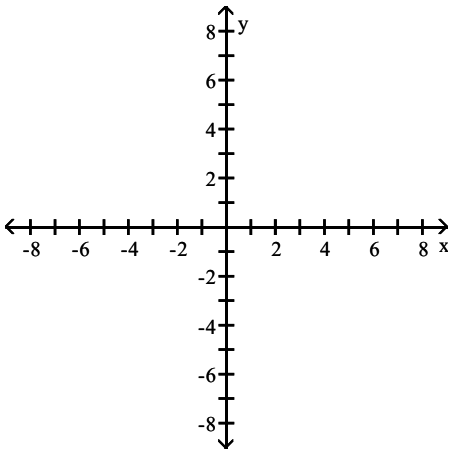


D)

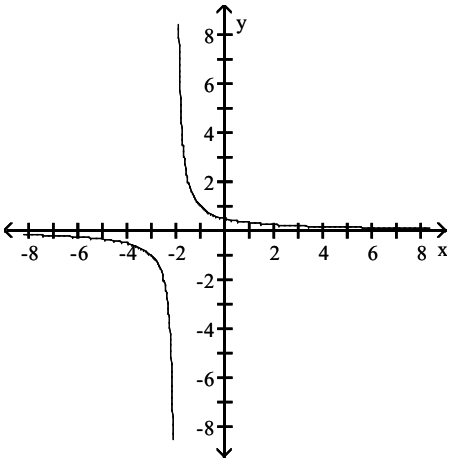


Answer: C

171) $y = \dfrac{x^2 + 4x + 4}{x + 2}$



A)



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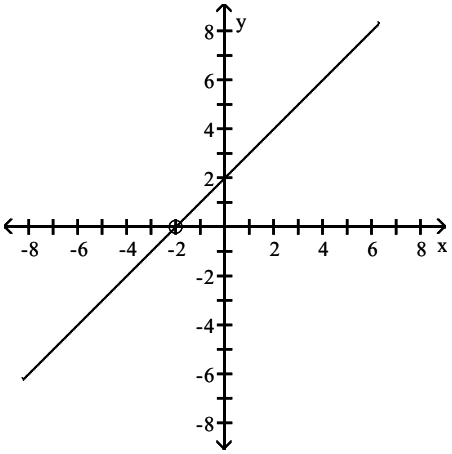
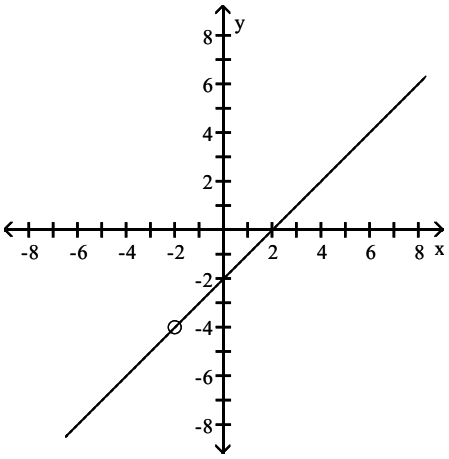
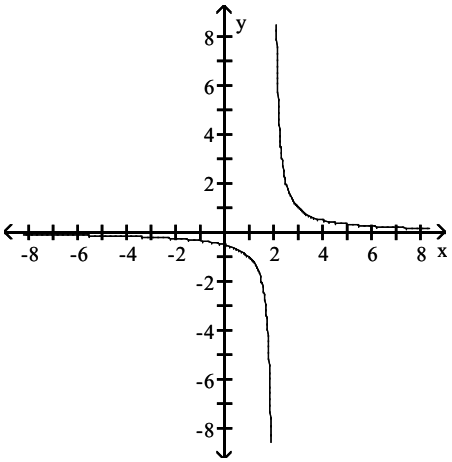


C)



D)



Answer: B

Solve the problem.

172) If the average cost per unit $\overline{C}(x)$ to produce x units of plywood is given by $\overline{C}(x) = \frac{900}{x + 30}$, what is the unit cost for 10 units?

A) \$60.00 B) \$90.00 C) \$22.50 D) \$3.00

Answer: C

173) 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 600 units cost?

A) \$18,000.00 B) \$150.00 C) \$580.65 D) \$599.97

Answer: C

174) Suppose the cost per ton, y, to build an oil platform of x thousand tons is approximated by $y = \frac{62{,}500}{x + 125}$. What is the cost for x = 400?

A) \$200,000.00 B) \$119.05 C) \$47,619.05 D) \$31.25

Answer: C

175) 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?

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

Answer: D

176) 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 per ton for x = 100?

A) \$50,000.00 B) \$43,103.45 C) \$2500.00 D) \$431.03

Answer: D

177) Suppose a cost–benefit model is given by $y = \frac{8.2x}{100 - x}$, where y is the cost in thousands of dollars for removing x percent of a given pollutant. Find the cost of removing 70% to the nearest dollar.

A) \$2333 B) \$19,133 C) \$5740 D) \$8200

Answer: B

178) 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 30%. Round your answer to the nearest billion.

A) \$926 billion B) \$981 billion C) \$856 billion D) \$956 billion

Answer: D

179) The polynomial function $I(t) = -0.1t^2 + 1.8t$ 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?

A) 12.00 B) 9 C) 18 D) 8

Answer: B

180) In the following formula, y is the minimum number of hours of studying required to attain a test score of x: $y = \frac{0.42x}{100.5 - x}$. How many hours of study are needed to score 89?

A) 3.25 hr B) 101.02 hr C) 32.50 hr D) 7.15 hr

Answer: A

181) 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 6 hours?

A) Yes B) No

Answer: A

182) 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 $p = 0$?

A) Yes B) No

Answer: A

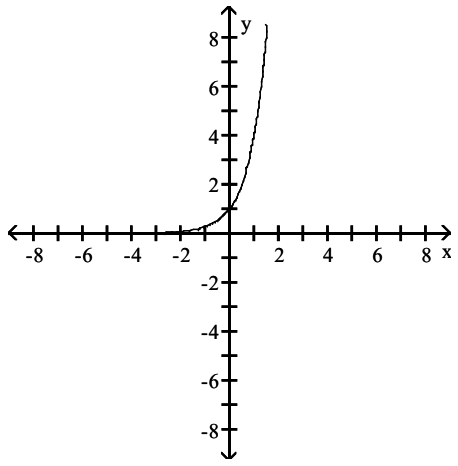
183) The polynomial function $G(x) = -0.006x^4 + 0.140x^3 - 0.53x^2 + 1.79x$ measures the concentration of a dye in the bloodstream x seconds after it is injected. Does the concentration increase between 12 and 13 seconds?

A) Yes B) No

Answer: A

Match the graph to the function.

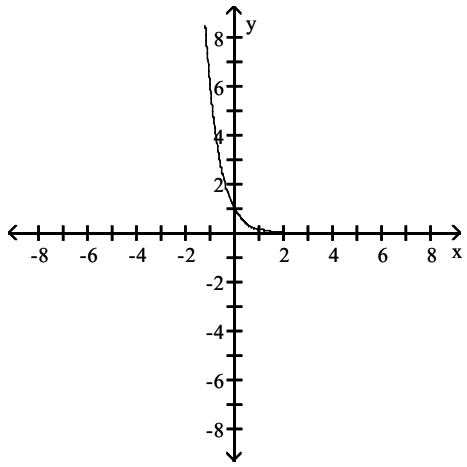
184)



A) $f(x) = 4^x + 2$ B) $f(x) = 4^x - 2$ C) $f(x) = 4^x$ D) $f(x) = 4^{x-2}$

Answer: C

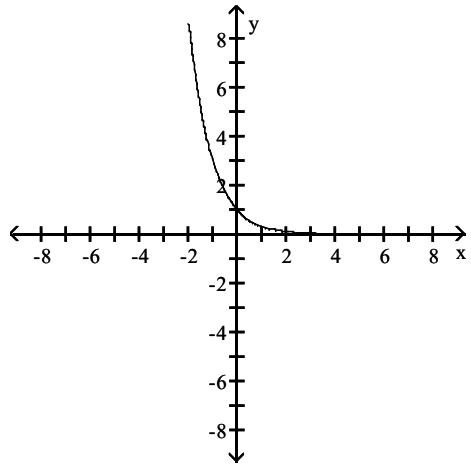
185)



A) $f(x) = -\left(\frac{1}{6}\right)^x$ B) $f(x) = -6^x$ C) $f(x) = 6^x$ D) $f(x) = \left(\frac{1}{6}\right)^x$

Answer: D

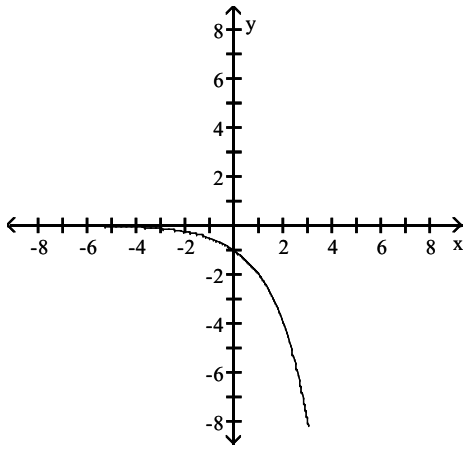
186)



A) $f(x) = 3^{-x}$ B) $f(x) = 3^x$ C) $f(x) = -3^{-x}$ D) $f(x) = -3^x$

Answer: A

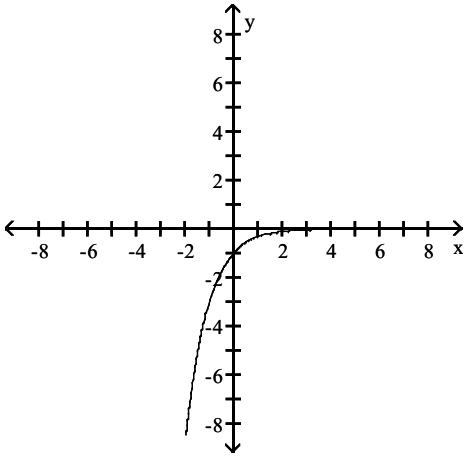
187)



A) $f(x) = 2^x$ B) $f(x) = -2^{-x}$ C) $f(x) = -2^x$ D) $f(x) = 2^{-x}$

Answer: C

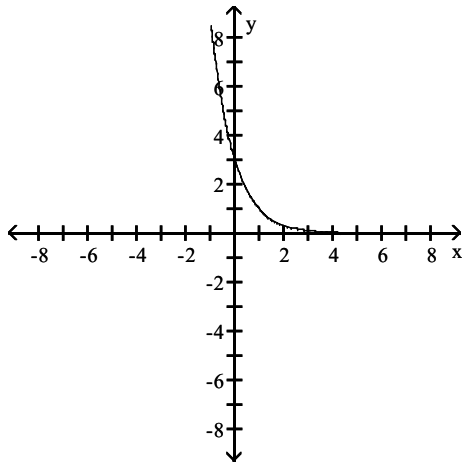
188)



A) $f(x) = -3^x$ B) $f(x) = 3^x$ C) $f(x) = 3^{-x}$ D) $f(x) = -3^{-x}$

Answer: D

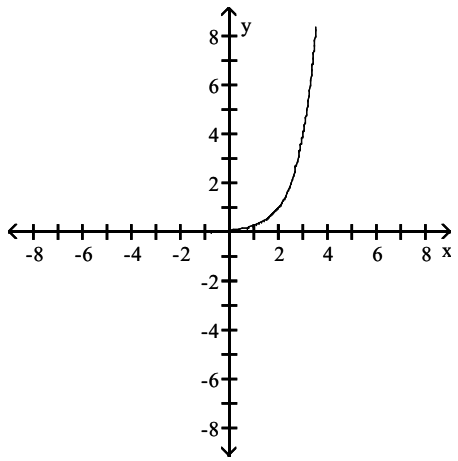
189)



A) $f(x) = -3\left(\frac{1}{3}\right)^x$ B) $f(x) = 3(3)^x$ C) $f(x) = -3(3)^x$ D) $f(x) = 3\left(\frac{1}{3}\right)^x$

Answer: D

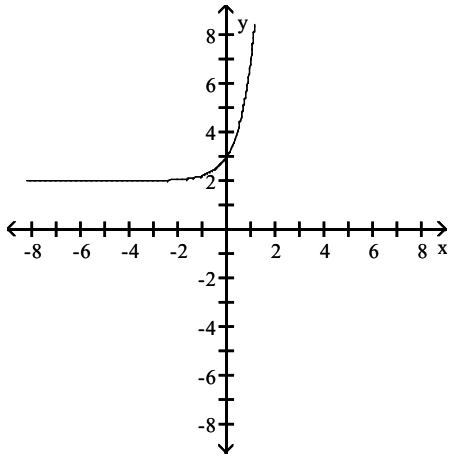
190)



A) $f(x) = 4^x - 2$ B) $f(x) = 4^x + 2$ C) $f(x) = 4^{x-2}$ D) $f(x) = 4^x$

Answer: C

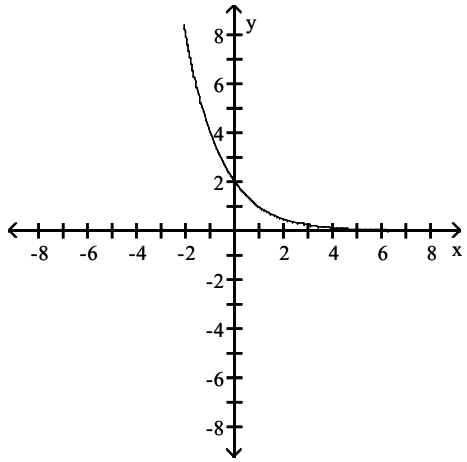
191)



A) $f(x) = 5^x$ B) $f(x) = 5^x - 2$ C) $f(x) = 5^{x+2}$ D) $f(x) = 5^x + 2$

Answer: D

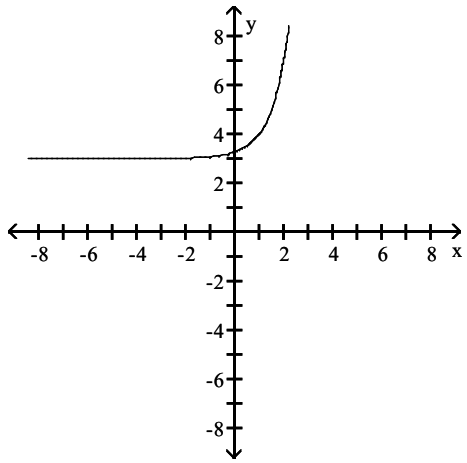
192)



A) $y = \left(\frac{1}{2}\right)^{x-1}$ B) $y = 2^{-x-1}$ C) $y = 2^{x+1}$ D) $y = \left(\frac{1}{2}\right)^{1-x}$

Answer: A

193)



A) $y = \left(\frac{1}{4}\right)^{x+1} + 3$ B) $y = \left(\frac{1}{4}\right)^{x-1} + 3$ C) $y = 4^{x+1} + 3$ D) $y = 4^{x-1} + 3$

Answer: D

Solve the equation.

194) $5^x = 125$

A) 3 B) 25 C) 2 D) 4

Answer: A

195) $4^{-x} = \frac{1}{64}$

A) 3 B) $\frac{1}{16}$ C) –3 D) $\frac{1}{3}$

Answer: A

196) $3^{(10-2x)} = 9$

A) 5 B) 3 C) –4 D) 4

Answer: D

197) $3^{(1+2x)} = 27$

A) –1 B) 1 C) 3 D) 9

Answer: B

198) $3^{(6-3x)} = \frac{1}{27}$

A) 3 B) 9 C) –3 D) $\frac{1}{9}$

Answer: A

199) $3^x = \frac{1}{9}$

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

Answer: D

200) $2^{(5 + 3x)} = \frac{1}{16}$

A) 8 B) $\frac{1}{8}$ C) –3 D) 3

Answer: C

201) $e^{-2x} = (e^7)^{3 - x}$

A) $\frac{3}{5}$ B) 0 C) $-\frac{21}{5}$ D) $\frac{21}{5}$

Answer: D

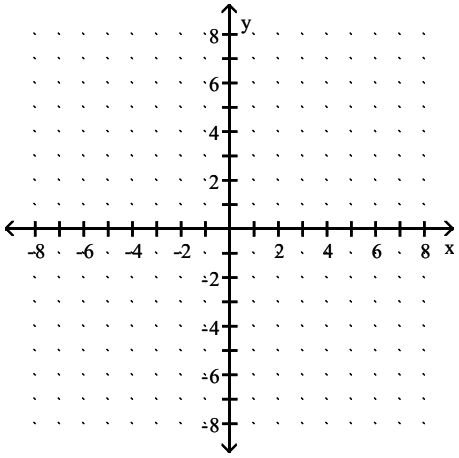
202) $3^{-|x|} = \frac{1}{9}$

A) 3, –3 B) 1, –1 C) 2, –2 D) 2

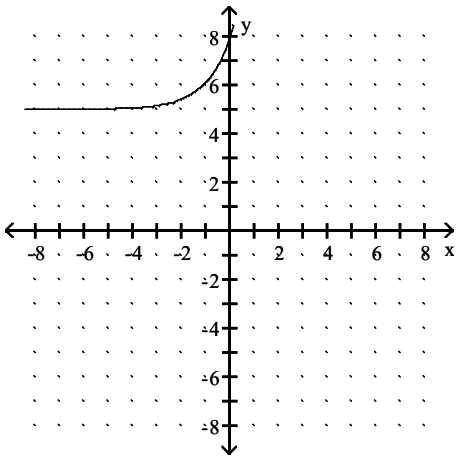
Answer: C

Graph the function.

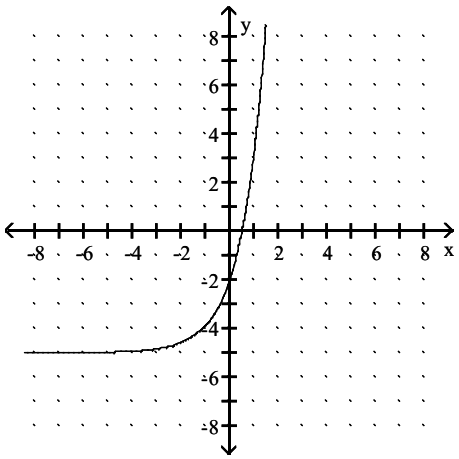
203) $y = 3e^x + 5$



A)



B)



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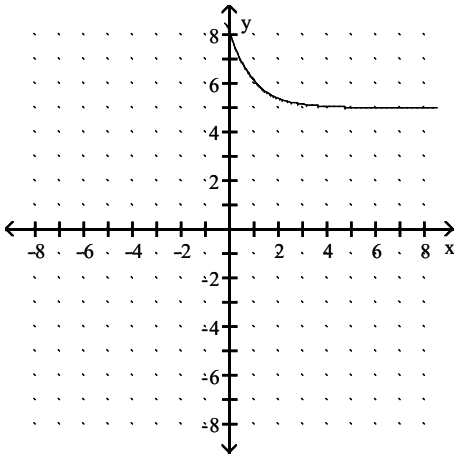
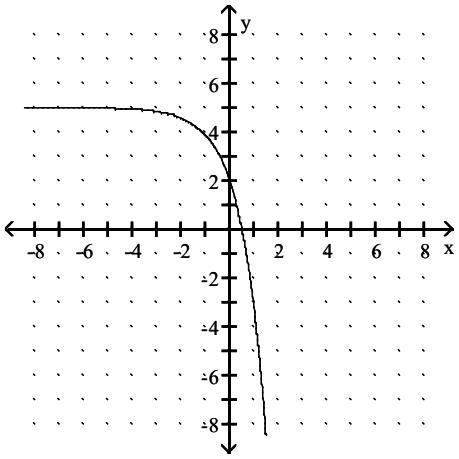
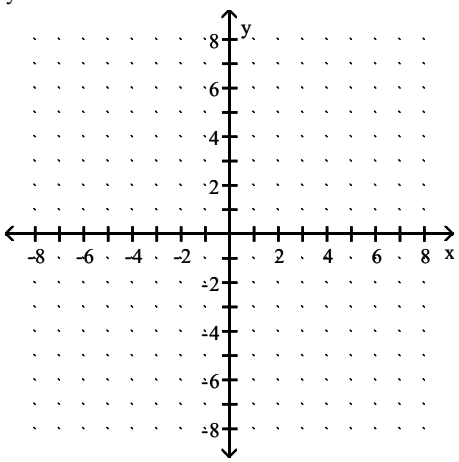


D)

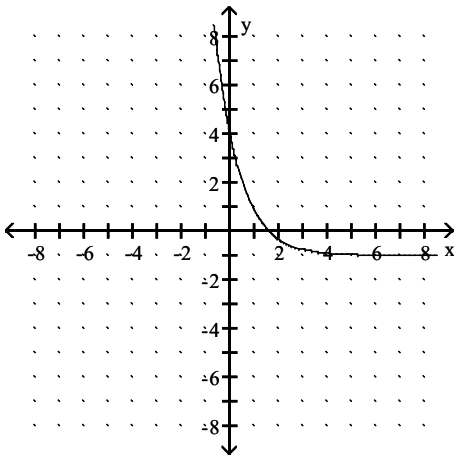


Answer: A

204) $y = -5e^x - 1$



A)



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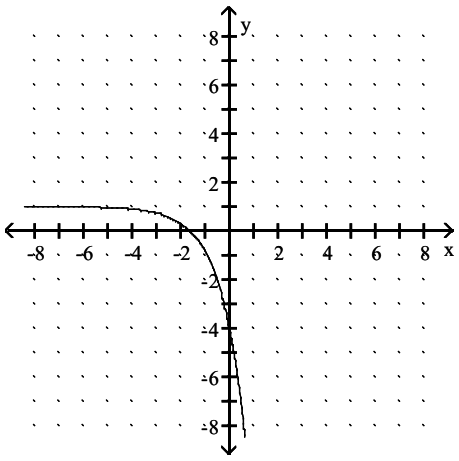

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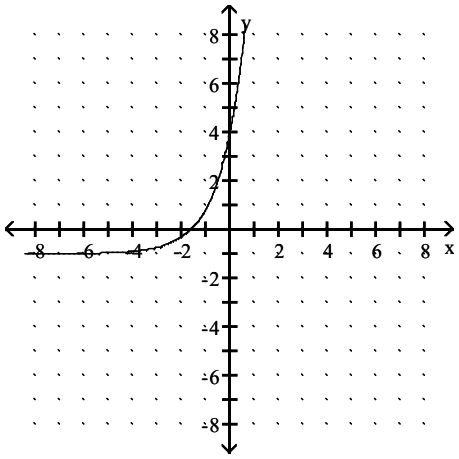
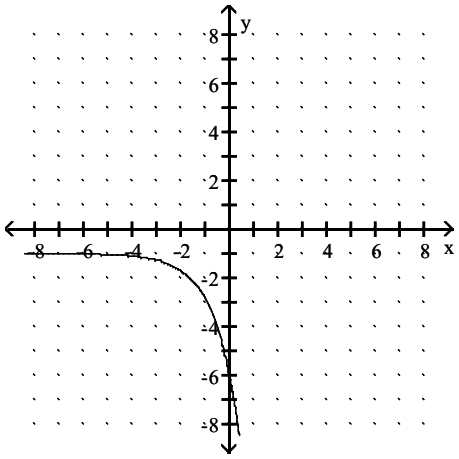
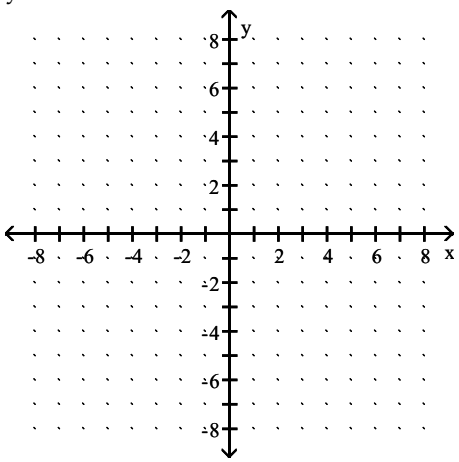


D)

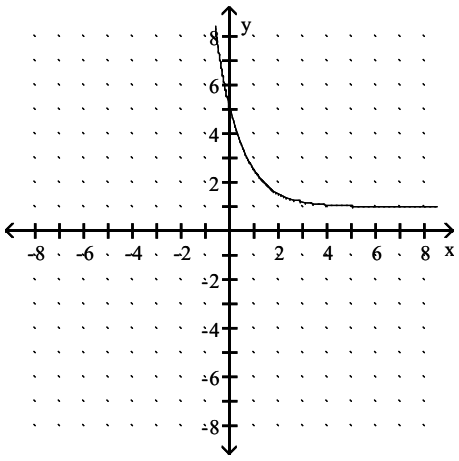


Answer: D

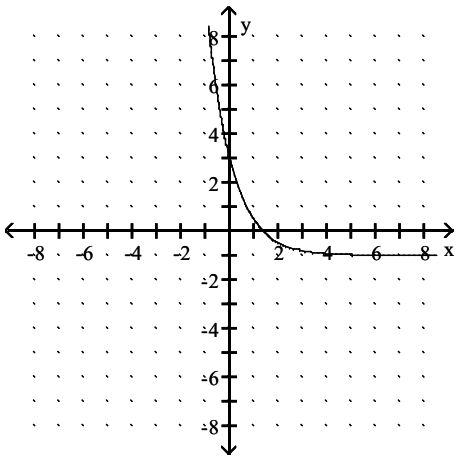
205) $y = 4e^{-x} - 1$



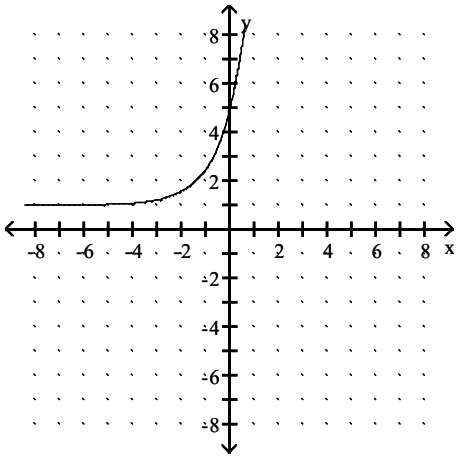
A)



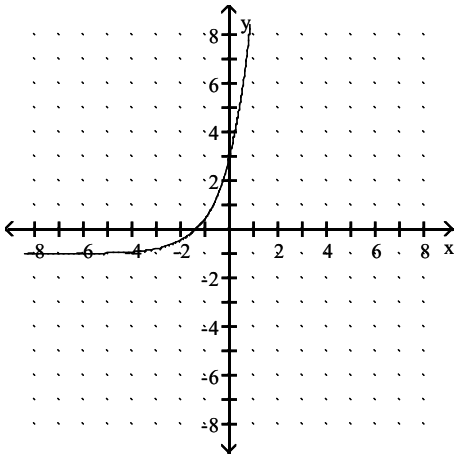
B)



C)

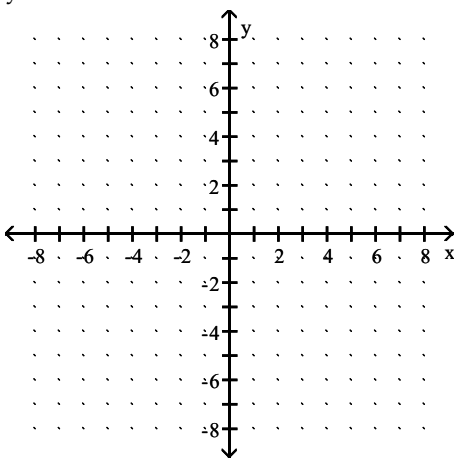


D)

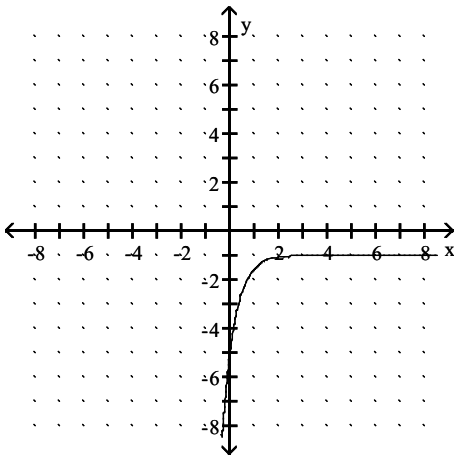


Answer: B

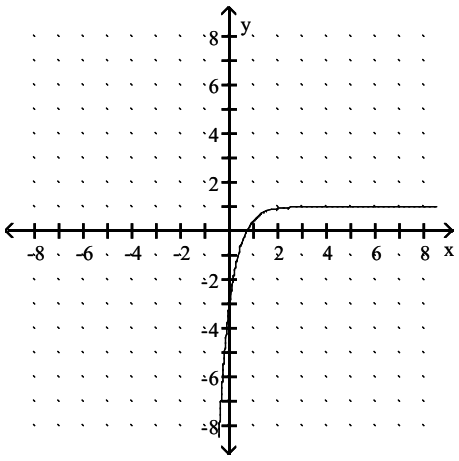
206) $y = 4e^{-2x} - 1$



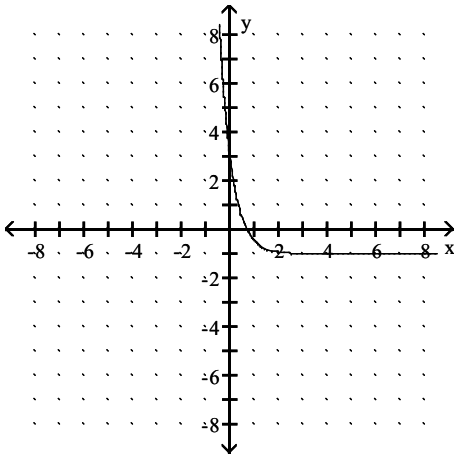
A)



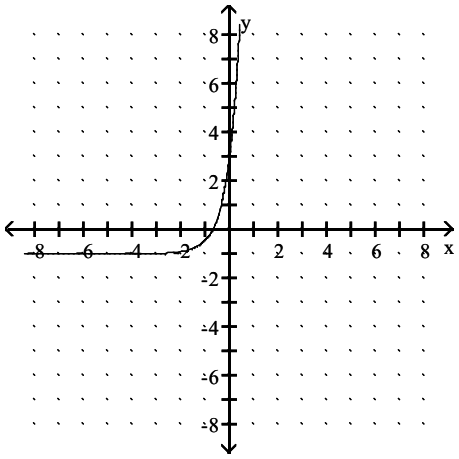
B)



C)

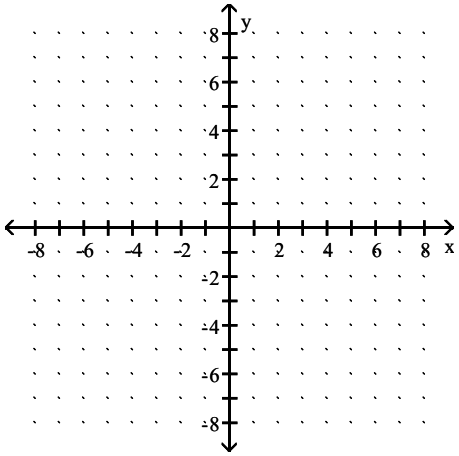


D)

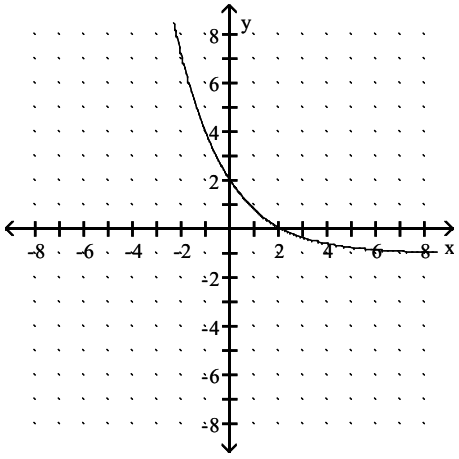


Answer: C

207) $y = -3e^{-x/2} + 1$



A)



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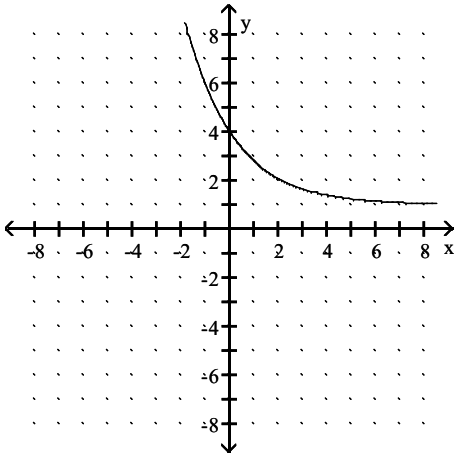
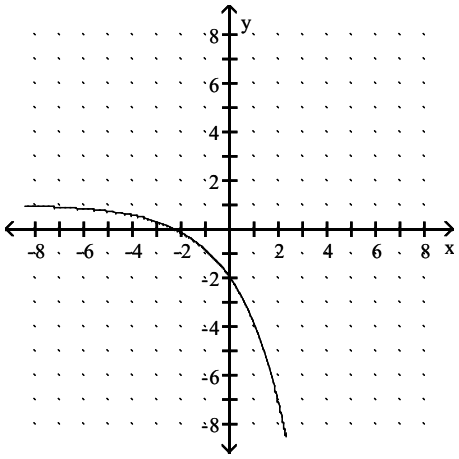
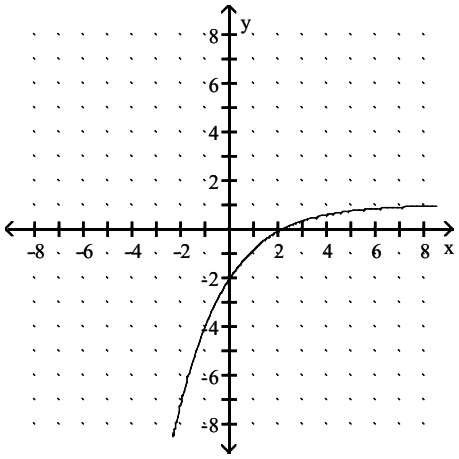


C)



D)



Answer: D

Solve the problem.

208) Find the amount of interest earned on the following deposit: $1000 at 7% compounded annually for 4 years

A) $1310.80 B) $402.55 C) $225.04 D) $310.80

Answer: D

209) How long will it take for prices in the economy to double at a 7% annual inflation rate? Round to the nearest hundredth when necessary.

A) 23.45 yr B) 16.24 yr C) 9.01 yr D) 10.24 yr

Answer: D

210) An economist predicts that the buying power B(x) of a dollar x years from now will decrease according to the formula $B(x) = 0.47^x$. How much will today's dollar be worth in 4 years? Round to the nearest cent.

A) $0.05 B) $0.74 C) $1.88 D) $1.92

Answer: A

211) Find the interest earned on $9000 invested for 8 years at 7.2% interest compounded quarterly. Round to the nearest cent.

A) $2973.11 B) $15,928.37 C) $6928.37 D) $1.77

Answer: C

212) Find the interest earned on $8000 invested for 6 years at 6.5% interest compounded monthly. Round to the nearest cent.

A) $3803.42 B) $3673.14 C) $3810.86 D) $3778.86

Answer: A

213) Suppose that the number of bacteria in a culture after x hours is given by $f(x) = 1000 \cdot 6^{0.5x}$. How many bacteria are in the culture after 4 hours?

A) 36,000 bacteria B) 18 bacteria C) 1806 bacteria D) 77 bacteria

Answer: A

214) Suppose that the number of bacteria in a culture after x hours is given by $f(x) = 500 \cdot 6^{0.167x}$. How many bacteria are in the culture after 8 hours?

A) 5477 bacteria B) 3 bacteria C) 2,250,000 bacteria D) 18,000 bacteria

Answer: A

215) The population of a particular city is increasing at a rate proportional to its size. It follows the function $P(t) = 1 + ke^{0.07t}$ where k is a constant and t is the time in years. If the current population is 39,000, in how many years is the population expected to be 97,500?

A) 7 yr B) 92 yr C) 13 yr D) 6 yr

Answer: C

216) The number of dislocated electric impulses per cubic inch in a transformer increases when lightning strikes by $D = 5600(3)^x$, where x is the time in milliseconds of the lightning strike. Find the number of dislocated impulses at $x = 0$ and $x = 5$.

A) 5600; 1,360,800 B) 16,800; 1,360,800 C) 5600; 151,200 D) 5600; 84,000

Answer: A

217) The number of bacteria growing in an incubation culture increases with time according to $B = 5800(5)^x$, where x is time in days. Find the number of bacteria when $x = 0$ and $x = 4$.

A) 5800 bacteria, 116,000 bacteria
B) 5800 bacteria, 18,125,000 bacteria
C) 5800 bacteria, 3,625,000 bacteria
D) 29,000 bacteria, 3,625,000 bacteria

Answer: C

218) The number of books in a small library increases according to the function $B = 5200e^{0.02t}$, where t is measured in years. How many books will the library have after 8 years?

A) 9529 books B) 6102 books C) 4139 books D) 7516 books

Answer: B

Write the exponential equation in logarithmic form.

219) $7^2 = 49$

A) $\log_7 49 = 2$ B) $\log_2 49 = 7$ C) $\log_7 2 = 49$ D) $\log_{49} 7 = 2$

Answer: A

220) $2^3 = 8$

A) $\log_2 8 = 3$ B) $\log_2 3 = 8$ C) $\log_8 2 = 3$ D) $\log_3 8 = 2$

Answer: A

221) $2^{-3} = \frac{1}{8}$

A) $\log_2 \frac{1}{8} = -3$ B) $\log_{-3} \frac{1}{8} = 2$ C) $\log_{1/8} 2 = -3$ D) $\log_2 -3 = \frac{1}{8}$

Answer: A

222) $\left(\frac{3}{8}\right)^{-2} = \frac{64}{9}$

A) $\log_{64/9} \frac{3}{8} = -2$ B) $\log_{3/8} \frac{64}{9} = -2$ C) $\log_{64/9} (-2) = \frac{3}{8}$ D) $\log_{3/8} (-2) = \frac{64}{9}$

Answer: B

Write the logarithmic equation in exponential form.

223) $\log_2 \frac{1}{8} = -3$

A) $2^8 = 3$ B) $2^{-3} = \frac{1}{8}$ C) $3^2 = \frac{1}{8}$ D) $\left(\frac{1}{8}\right)^3 = 2$

Answer: B

224) $\log_5 125 = 3$

A) $5^3 = 125$ B) $3^5 = 125$ C) $125^3 = 5$ D) $5^{125} = 3$

Answer: A

225) $\log 0.00001 = -5$

A) $-5^{10} = 0.00001$ B) $10^{-5} = 0.00001$ C) $10^{0.00001} = -5$ D) $0.00001^{-5} = 10$

Answer: B

226) $\log_2 128 = 7$

A) $2^7 = \frac{1}{128}$ B) $2^7 = 128 + 1$ C) $2^7 = 128$ D) $2^7 = 7$

Answer: C

227) $\log 10{,}000{,}000 = 7$

A) $10^7 = 7$ B) $10^7 = 10{,}000{,}000$ C) $10^7 = 100{,}000{,}000$ D) $10^7 = \frac{1}{10{,}000{,}000}$

Answer: B

228) $\ln x = 3$

A) $3^e = x$ B) $e^3 = x$ C) $x^3 = e$ D) $e^x = 3$

Answer: B

229) $\ln \frac{1}{e^6} = -6$

A) $\left(\frac{1}{e^6}\right)^e = -6$ B) $\left(\frac{1}{e^6}\right)^{-6} = e$ C) $e^{-6} = \frac{1}{e^6}$ D) $-6^e = \frac{1}{e^6}$

Answer: C

230) $\ln e^8 = 8$

A) $\ln e^8 = e^8$ B) $e^8 = 8$ C) $\ln 8 = 8$ D) $e^8 = e^8$

Answer: D

231) $\ln e^{1/6} = \frac{1}{6}$

A) $\ln \frac{1}{6} = e^{1/6}$ B) $e^{1/6} = e^{1/6}$ C) $e^6 = e^{1/6}$ D) $e^{1/6} = \frac{1}{6}$

Answer: B

Evaluate the logarithm without using a calculator.

232) $\log_{10} 1000$

A) 10 B) 3 C) 1000 D) 30

Answer: B

233) $\log_4 \frac{1}{4}$

A) 4 B) 0 C) 1 D) –1

Answer: D

234) $\log_7 \frac{1}{49}$

A) 2 B) 7 C) –2 D) –7

Answer: C

235) $\log_{10} 10$

A) 10 B) 0 C) –1 D) 1

Answer: D

236) $\log_9 \frac{1}{729}$

A) 3 B) –81 C) 81 D) –3

Answer: D

237) $\log_8 32$

A) $\frac{5}{3}$ B) $\frac{4}{3}$ C) $\frac{5}{4}$ D) $\frac{3}{2}$

Answer: A

238) $\ln e$

A) 1 B) e C) 0 D) –1

Answer: A

239) $\ln 1$

A) e B) 0 C) –1 D) 1

Answer: B

240) $\log_9 \sqrt[4]{\frac{1}{81}}$

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

Answer: A

241) $\ln e^{5/6}$

A) $\frac{6}{5}$e B) $\frac{6}{5}$ C) $\frac{5}{6}$ D) $\frac{5}{6}$e

Answer: C

Rewrite the expression as a sum, difference, or product of simpler logarithms.

242) $\log_8 10x$

A) $\log_4 10 - \log_4 x$ B) $\log_4 10 + \log_4 x$ C) $\log_8 10 - \log_8 x$ D) $\log_8 10 + \log_8 x$

Answer: D

243) $\log_8 xy$

A) $\log_8 x - \log_8 y$ B) $\log_4 x + \log_4 y$ C) $\log_8 x + \log_8 y$ D) $\log_4 x - \log_4 y$

Answer: C

244) $\log_6 \frac{4}{5}$

A) $\log_6 5 - \log_6 4$ B) $\log_6 4 + \log_6 5$ C) $\log_6 4 - \log_6 5$ D) $\log_3 4 - \log_3 5$

Answer: C

245) $\log_8 \frac{\sqrt{3}}{5}$

A) $\left(\frac{1}{2}\right)\log_4 3 - \log_4 5$ B) $\log_8 5 - \left(\frac{1}{2}\right)\log_8 3$ C) $\left(\frac{1}{2}\right)\log_8 3 + \log_8 5$ D) $\left(\frac{1}{2}\right)\log_8 3 - \log_8 5$

Answer: D

246) $\log_3 \frac{4p}{3k}$

A) $\log_3 4 + \log_3 p - 1 - \log_3 k$ B) $\frac{\log_3 4 + \log_3 p}{1 + \log_3 k}$

C) $\log_3 4p - \log_3 3k$ D) $\frac{\log_3 4 \log_3 p}{\log_3 k}$

Answer: A

247) $\log_8 \frac{7\sqrt[5]{5}}{\sqrt[4]{3}}$

A) $\log_8 7 + 5\log_8 5 - 4\log_8 3$ B) $\log_8 7 + \frac{1}{5}\log_8 5 - \frac{1}{4}\log_8 3$

C) $\frac{\log_8 7 + \frac{1}{5}\log_8 5}{\frac{1}{4}\log_8 3}$ D) $\frac{\log_8 7 + 5\log_8 5}{4\log_8 3}$

Answer: B

Use the properties of logarithms to find the value of the expression.

248) Let $\log_b A = 3$ and $\log_b B = -4$. Find $\log_b AB$.

A) -12 B) 7 C) -1 D) 12

Answer: C

249) Let $\log_b A = 4$ and $\log_b B = -12$. Find $\log_b \frac{A}{B}$.

A) −8 B) $-\frac{1}{3}$ C) $\frac{1}{3}$ D) 16

Answer: D

250) Let $\log_b A = 3$ and $\log_b B = -4$. Find $\log_b B^2$.

A) −8 B) 6 C) 16 D) −16

Answer: A

251) Let $\log_b A = 5$ and $\log_b B = -4$. Find $\log_b \sqrt[2]{AB}$.

A) 4.472 B) −4.472 C) 0.500 D) $2\sqrt{-20}$

Answer: C

252) Let $\log_b A = 2.805$ and $\log_b B = 0.172$. Find $\log_b AB$.

A) 16.308 B) 2.633 C) 2.977 D) 0.482

Answer: C

253) Let $\log_b A = 3.823$ and $\log_b B = 0.298$. Find $\log_b \frac{A}{B}$.

A) 3.823 B) 1.139 C) 4.121 D) 3.525

Answer: D

254) Let $\log_b 3 = a$ and $\log_b 2 = c$. Find $\log_b \left(9b^2\right)$.

A) 2(a + b) B) 2ab C) 2b + a − 2 D) 2a + 2

Answer: D

Use natural logarithms to evaluate the logarithm to the nearest thousandth.

255) $\log_8 27$

A) 3.375 B) 1.431 C) 0.631 D) 1.585

Answer: D

256) $\log_9 0.372$

A) −2.222 B) −0.429 C) −0.450 D) 24.194

Answer: C

257) $\log_{6.2} 171$

A) 2.818 B) 27.581 C) 0.355 D) 2.233

Answer: A

258) $\log_{5.8} 2.9$

A) 0.500 B) 0.606 C) 1.651 D) 0.462

Answer: B

259) $\log_{\sqrt{2}} 73.7$

A) 12.407 B) 0.151 C) 0.081 D) 6.204

Answer: A

Solve the equation.

260) $\log 5x = \log 4 + \log (x + 3)$

A) -12 B) 12 C) $\frac{7}{4}$ D) $\frac{4}{3}$

Answer: B

261) $\log (x + 5) = \log (2x + 4)$

A) -1 B) 1 C) $-\frac{5}{6}$ D) 9

Answer: B

262) $\log_3 x = 4$

A) 64 B) 12 C) 81 D) 1.26

Answer: C

263) $\log_y 7 = 2$

A) $\frac{7}{2}$ B) $2^{1/7}$ C) 7^2 D) $7^{1/2}$

Answer: D

264) $\log (5 + x) - \log (x - 2) = \log 2$

A) -9 B) 9 C) $-\frac{1}{2}$ D) No solution

Answer: B

265) $\log_5 (4x - 1) = \log_5 (2x + 3)$

A) 1 B) 2 C) 2 D) No solution

Answer: C

266) $\log_5 (7x + 4) = \log_5 (7x + 7)$

A) $\frac{4}{7}$ B) 0 C) $-\frac{11}{3}$ D) No solution

Answer: D

267) $\log_7 x^2 = \log_7 (2x + 3)$

A) $\frac{3}{7}$ B) 3, -1 C) 3 D) No solution

Answer: B

268) $\frac{1}{2} \log_2 x^2 = \log_4 4x$

A) 4, 0 B) 8 C) 4 D) No solution

Answer: C

Solve the equation. Round decimal answers to the nearest thousandth.

269) $4^x = 23$

A) 1.749 B) 2.262 C) 0.442 D) 5.750

Answer: B

270) $e^{-0.04x} = 0.03$

A) 3.507 B) 87.664 C) −0.75 D) −87.664

Answer: B

271) $e^{y + 3} = 7$

A) −1.054 B) −2.155 C) 4.946 D) 0.649

Answer: A

272) $3^{(5x - 2)} = 24$

A) 0.179 B) 2.000 C) 0.979 D) 0.816

Answer: C

273) $6e^{6x - 2} = 36$

A) 0.433 B) 0.632 C) 6.333 D) −0.035

Answer: B

274) $3e^{5x+9} = 6$

A) −1.661 B) −3.199 C) −0.401 D) −2.921

Answer: A

275) $50.48^x = 100.28^x$

A) 0.154 B) −1.949 C) 0.000 D) −0.345

Answer: C

Write the expression using base e rather than base 10.

276) $10^{x + 2}$

A) $e^{(\ln 10)(x + 2)}$ B) $e^{10(x + 2)}$ C) $(x + 2)e^{10}$ D) $10e^{x + 2}$

Answer: A

277) 10^{x^5}

A) $e^{(\ln 10)x^5}$ B) e^{10x^5} C) x^5e^{10} D) $10e^{x^5}$

Answer: A

Approximate the expression in the form a^x without using e. Round to the nearest thousandth when necessary.

278) e^{7x}

A) 19.028^x B) 1.946^x C) 198.251^x D) 1096.633^x

Answer: D

279) e^{-6x}

A) -1.792^x B) 0.002^x C) 0.453^x D) -16.31^x

Answer: B

Find the domain of the function.

280) $f(x) = \log (x - 3)$

A) $x > 1$ B) $x > -3$ C) $x > 0$ D) $x > 3$

Answer: D

281) $f(x) = \ln (8 - x)$

A) $x > 8$ B) $x > -8$ C) $x < -8$ D) $x < 8$

Answer: D

282) $f(x) = \log_9 (49 - x^2)$

A) $-49 < x < 49$ B) $-7 \le x \le 7$ C) $-7 < x < 7$ D) $x < -7$ and $x > 7$

Answer: C

283) $f(x) = \ln (9x - x^2)$

A) $0 < x < 9$ B) $-9 \le x < 0$ C) $-9 < x < 9$ D) $x \le 9$

Answer: A

Solve the problem.

284) Sonja and Chris both accept new jobs on March 1, 2001. Sonja starts at $48,000 with a raise each March 1 of 5%. Chris starts at $33,000 with a raise on March 1 of each year of 7%. In what year will Chris' salary exceed Sonja's?

A) 2022 B) 2019 C) 2021 D) 2020

Answer: A

285) A college student invests $7000 in an account paying 8% per year compounded annually. In how many years will the amount at least quadruple? Round to the nearest tenth when necessary.

A) 18 yr B) 19.5 yr C) 22.2 yr D) 20.9 yr

Answer: A

286) How long will it take for prices in the economy to double at a 4% annual inflation rate? Round to the nearest hundredth when necessary.

A) 28.01 yr B) 23.45 yr C) 17.67 yr D) 14.21 yr

Answer: C

287) Assume the cost of a car is $21,000. With continuous compounding in effect, find the number of years it would take to double the cost of the car at an annual inflation rate of 3%. Round to the nearest hundredth.

A) 3.32 yr B) 354.85 yr C) 331.74 yr D) 23.10 yr

Answer: D

288) Suppose the consumption of electricity grows at 8% per year, compounded continuously. Find the number of years before the use of electricity has tripled. Round to the nearest hundredth.

A) 37.50 yr B) 1.37 yr C) 13.73 yr D) 0.14 yr

Answer: C

289) The purchasing power of a dollar is decreasing at the rate of 6% annually, compounded continuously. How long will it take for the purchasing power of $1.00 to be worth $0.34? Round to the nearest hundredth.

A) 0.18 yr B) 5.67 yr C) 17.98 yr D) 1.80 yr

Answer: C

290) At what interest rate must $5100 be compounded annually to equal $7258.89 after 9 years? Round to the nearest percent.

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

Answer: B

291) Kimberly invested $3000 in her savings account for 7 years. When she withdrew it, she had $4695.54. Interest was compounded continuously. What was the interest rate on the account? Round to the nearest tenth of a percent when necessary.

A) 6.3% B) 6.4% C) 6.5% D) 6.55%

Answer: B

292) The magnitude of an earthquake, measured on the Richter scale, is given by $R(I) = \log\frac{I}{I_0}$, where I is the amplitude registered on a seismograph located 100 km from the epicenter of the earthquake, and I_0 is the amplitude of a certain small size earthquake. Find the Richter scale rating of an earthquake with an amplitude of 398,107 I_0.

A) 5.6 B) 12.9 C) 0.56 D) 4.6

Answer: A

293) The magnitude of an earthquake, measured on the Richter scale, is given by $R(I) = \log\frac{I}{I_0}$, where I is the amplitude registered on a seismograph located 100 km from the epicenter of the earthquake, and I_0 is the amplitude of a certain small size earthquake. An earthquake measured 5.2 on the Richter scale. Express this reading in terms of I_0.

A) 125,893 I_0 B) 181 I_0 C) 158,489 I_0 D) 15,849 I_0

Answer: C

294) The magnitude of an earthquake, measured on the Richter scale, is given by $R(I) = \log\frac{I}{I_0}$, where I is the amplitude registered on a seismograph located 100 km from the epicenter of the earthquake, and I_0 is the amplitude of a certain small size earthquake. Find the Richter scale rating of an earthquake with an amplitude of $10^{7.8}$ I_0.

A) 2.2 B) 17.8 C) 18 D) 7.8

Answer: D

295) A certain noise has intensity 2.69×10^8 I_0. What is the decibel rating of this sound? Use the formula $D = 10 \log I_0$, where I_0 is a faint threshold sound, and I is the intensity of the sound."

A) 84 decibels B) 74 decibels C) 8 decibels D) 194 decibels

Answer: A

296) The pH of a solution is defined as $pH = -\log[H^+]$, where $[H^+]$ is the concentration of hydrogen ions in the solution. The pH of pure water is 7, while the pH of vinegar is about 3. How much greater is the concentration of hydrogen ions in vinegar than in pure water?

A) 1,000,000 times greater B) 1000 times greater
C) 10,000 times greater D) 4 times greater

Answer: C

297) An RC circuit is a simple electronic circuit consisting of a resistor, a capacitor, and a battery. The current i in the circuit at some time t after the battery is connected is $i = \frac{V}{R}e^{-t/(RC)}$, where V is the battery's voltage, R is the resistance, and C is the capacitance. Solve this equation for C.

A) $C = \frac{V}{R}e^{-t/(iR)}$ B) $C = \frac{Ve^{-t}}{R^2C}$ C) $C = \frac{t}{R \ln\left(\frac{V}{iR}\right)}$ D) $C = \frac{-R}{t \ln\left(\frac{iR}{V}\right)}$

Answer: C

298) One hundred rats are being trained to run through a maze and are rewarded when they run through it correctly. Once a rat successfully runs the maze, it continues to run the maze correctly in all subsequent trials. The number of rats that run the maze *incorrectly* after t attempts is given approximately by $N(t) = 100e^{-.12t}$. Find the number of trials required such that only 35% of the rats are running the maze incorrectly. Round to the nearest trial.

A) 28 trials B) 9 trials C) 8 trials D) 30 trials

Answer: B

299) The population growth of an animal species is described by $F(t) = 800 + 60 \log_3 (2t + 1)$ where t is measured in months. Find the population of this species in an area 40 month(s) after the species is introduced.

A) 5660 B) 1040 C) 530 D) 2850

Answer: B

300) Coyotes are one of the few species of North American animals with an expanding range. The future population of coyotes in a region of Mississippi can be modeled by the equation $P = 58 + 18 \ln(13t + 1)$, where t is time in years. Use the equation to determine when the population will reach 170. (Round to the nearest tenth of a year.)

A) 128,315.3 yr B) 39 yr C) 38.7 yr D) 38.8 yr

Answer: C

301) Find the effective rate corresponding to the nominal rate. 6% compounded monthly. Round to the nearest hundredth.

A) 6.26% B) 6.17% C) 6.12% D) 6.23%

Answer: B

302) Find the effective rate corresponding to the nominal rate. 6% compounded quarterly. Round to the nearest hundredth.

A) 6.23% B) 6.09% C) 6.20% D) 6.14%

Answer: D

303) Find the present value of the deposit. $3000 at 4% compounded monthly for 2 years. Round to the nearest cent.

A) $3241.43 B) $3249.43 C) $2777.72 D) $2769.72

Answer: D

304) Find the present value of the deposit. $10,000 at 8% compounded quarterly for 5 years. Round to the nearest cent.

A) $6729.71 B) $14,859.47 C) $6769.71 D) $14,819.47

Answer: A

305) Find the present value of the deposit. $500 at 9% compounded continuously for 10 years. Round to the nearest dollar.

A) $8108 B) $7814 C) $203 D) $2259

Answer: C

306) Find the present value of the deposit. $13,000 at 5% compounded continuously for 10 years. Round to the nearest dollar.

A) $168,645 B) $157,706 C) $7885 D) $417,706

Answer: C

307) Barbara knows that she will need to buy a new car in 5 years. The car will cost $15,000 by then. How much should she invest now at 5%, compounded quarterly, so that she will have enough to buy a new car? Round to the nearest cent.

A) $11,193.23 B) $13,257.81 C) $11,700.13 D) $12,340.54

Answer: C

308) Southwest Dry Cleaners believes that it will need new equipment in 9 years. The equipment will cost $26,000. What lump sum should be invested today at 5% compounded semiannually, to yield $26,000? Round to the nearest cent.

A) $20,775.96 B) $16,670.31 C) $20,905.81 D) $23,097.31

Answer: B

309) An investment of $13,335 earns 8% interest compounded monthly for 3 years. (a) What is the value of the investment after 3 years? (b) If money can be deposited at 6% compounded quarterly, find the present value of the investment. Round to the nearest cent.

A) (a) $16,826.43 (b) $15,262.14
B) (a) $17,938.61 (b) $16,262.14
C) (a) $14,441.80 (b) $14,379.75
D) (a) $16,938.61 (b) $14,167.24

Answer: D

310) If money can be invested at 9% compounded quarterly, which is larger -- $1000 now or the present value of $1210 left at 9% interest for 4 years?

A) $1000 now B) Present value of $1210 left for 4 years

Answer: A

311) A certificate of deposit pays 8% interest compounded semiannually. What effective interest rate does the CD pay? Round to the nearest tenth when necessary.

A) 7.1% B) 16.6% C) 8.9% D) 8.2%

Answer: D

312) The sales of a new model of notebook computer are approximated by: $S(x) = 5000 - 13{,}000e^{-x/10}$, where x represents the number of months the computer has been on the market and S represents sales in thousands of dollars. In how many months will the sales reach $2,000,000? Round to the nearest month.

A) 25 months B) 15 months C) 18 months D) 22 months

Answer: B

313) The sales of a mature product (one which has passed its peak) will decline by the function $S(t) = S_0e^{-at}$, where t is time in years. Find the sales after 22 years if $a = 0.13$ and $S_0 = 38{,}800$. Round to the nearest sale.

A) 34,070 sales B) 2222 sales C) 1951 sales D) 1111 sales

Answer: B

314) The number of books in a small library increases according to the function $B = 2500e^{0.02t}$, where t is measured in years. How many books will the library have after 4 years? Round to the nearest book.

A) 2742 books B) 6314 books C) 3006 books D) 2708 books

Answer: D

315) In the formula $N = Ie^{kt}$, N is the number of items in terms of an initial population I at a given time t and k is a growth constant equal to the percent of growth per unit time. How long will it take for the population of a certain country to double if its annual growth rate is 0.6%? Round to the nearest year.

A) 50 yr B) 116 yr C) 1 yr D) 333 yr

Answer: B

316) In the formula $N = Ie^{kt}$, N is the number of items in terms of an initial population I at a given time t and k is a growth constant equal to the percent of growth per unit time. How long will it take for the population of a certain country to triple if its annual growth rate is 1.2%? Round to the nearest year.

A) 1 yr B) 92 yr C) 250 yr D) 40 yr

Answer: B

317) In the formula $N = Ie^{kt}$, N is the number of items in terms of an initial population I at a given time t and k is a growth constant equal to the percent of growth per unit time. There are currently 75 million cars in a certain country, increasing by 2.4% annually. How many years will it take for this country to have 101 million cars? Round to the nearest year.

A) 11 yr B) 12 yr C) 4 yr D) 136 yr

Answer: B

318) The number of acres in a landfill decreases according to the function $B = 4300e^{-0.03t}$, where t is measured in years. How many acres will the landfill have after 1 years?

A) 4013 acres B) 6548 acres C) 15,078 acres D) 4173 acres

Answer: D

319) A bacteria colony doubles in 5 hr. How long does it take the colony to triple? Use $N = N_0\, 2^{t/T}$, where N_0 is the initial number of bacteria and T is the time in hours it takes the colony to double. (Round to the nearest hundredth, as necessary.)

A) 7.92 hr B) 7.5 hr C) 15 hr D) 2.03 hr

Answer: A

320) The population of a small country increases according to the function $B = 1{,}100{,}000e^{0.04t}$, where t is measured in years. How many people will the country have after 9 years?

A) 1,123,816 people B) 1,576,662 people C) 488,067 people D) 2,519,954 people

Answer: B

321) Use the formula $P = Ie^{kt}$. A bacterial culture has an initial population of 10,000. If its population declines to 3000 in 2 hours, what will it be at the end of 4 hours?

A) 4481 bacteria B) 3500 bacteria C) 900 bacteria D) 450 bacteria

Answer: C

322) In the formula $A(t) = A_0e^{kt}$, A(t) is the amount of radioactive material remaining from an initial amount A_0 at a given time t and k is a negative constant determined by the nature of the material. A certain radioactive isotope has a half–life of approximately 1050 years. How many years would be required for a given amount of this isotope to decay to 25% of that amount?

A) 2100 yr B) 2075 yr C) 436 yr D) 787.5 yr

Answer: A

323) In the formula $A(t) = A_0e^{kt}$, A(t) is the amount of radioactive material remaining from an initial amount A_0 at a given time t and k is a negative constant determined by the nature of the material. An artifact is discovered at a certain site. If it has 65% of the carbon–14 it originally contained, what is the approximate age of the artifact, rounded to the nearest year? (carbon–14 decays at the rate of 0.0125% annually.)

A) 3446 yr B) 1497 yr C) 5200 yr D) 2800 yr

Answer: A

324) In the formula $A(t) = A_0e^{kt}$, A(t) is the amount of radioactive material remaining from an initial amount A_0 at a given time t and k is a negative constant determined by the nature of the material. A certain radioactive isotope decays at a rate of 0.2% annually. Determine the half–life of this isotope, to the nearest year.

A) 151 yr B) 250 yr C) 347 yr D) 3 yr

Answer: C

325) The amount of particulate matter left in solution during a filtering process decreases by the equation $P = 400(2)^{-0.4n}$, where n is the number of filtering steps. Find the amounts left for n = 0 and n = 5. (Round to the nearest whole number.)

A) 400, 1600 B) 800, 100 C) 400, 100 D) 400, 13

Answer: C

326) The decay of 906 mg of an isotope is given by $A(t)= 906e^{-0.033t}$, where t is time in years. Find the amount left after 36 years.

A) 877 mg B) 267 mg C) 276 mg D) 138 mg

Answer: C

327) Newton's law of cooling states that the temperature f(t) of a body at time t is given by: $f(t) = T_0 + Ce^{-kt}$, where C and k are constants and T_0 is the temperature of the environment in which the object rests. If C = –29.4 and k = 0.04 and t is in hours, how long will it take for a frozen roast to thaw to a temperature of 0°C in a refrigerator that is at 5°C? Round your answer to the nearest hour.

A) 44 hr B) 48 hr C) 42 hr D) 38 hr

Answer: A

328) Newton's law of cooling states that the temperature f(t) of a body at time t is given by: $f(t) = T_0 + Ce^{-kt}$, where C and k are constants and T_0 is the temperature of the environment in which the object rests. If C = 280 and k = 0.15 and t is in minutes, how long will it take for a glass baking dish containing brownies to cool to a comfortable–to–touch temperature of 98°F in a room that is at 69°F? Round your answer to the nearest minute.

A) 15 min B) 10 min C) 19 min D) 12 min

Answer: A

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

Provide an appropriate response.

329) The graph of y = f(x) has an x–intercept of a and a y–intercept of b. What are the intercepts of the graph of y = f(–x)?

Answer: x–intercept is –a ; y–intercept is b

330) A classmate claims that, if a function f(x) has a horizontal asymptote at y = w, then the function can only approach w but cannot actually equal w. Evaluate the classmate's claim.

Answer: The classmate's claim is wrong. The horizontal asymptote tells us what the behavior of f(x) will be as x approaches the extremes of its domain, but puts no restrictions on the function in between the extremes.

331) Suppose the population of deer fluctuates over time. The population increases in the summer and decreases in the winter. It also varies over many years as well. If you looked at the graph of population versus time, would this relation be a function? Why or why not?

Answer: This would be a function because at any given time there is only one possible population. Despite the fact that the population can reach the same level several times this is still a function, but for each point in time, there can be no more than one population.

332) Consider the linear function f(x) = 5x + 20. What is the domain and range of this function? Now, suppose the function represents the relationship between studying time and grades on an exam. The variable x represents the number of hours spent studying and f(x) represents the grade on the exam. Does this change the domain and range? If so, what is the new domain and range and why is it different?

Answer: The domain is all real numbers and the range is the set of all real numbers. In the context of exam grades, the domain and range both become the set of nonegative real numbers. In this context, times and grades less than zero do not make sense.

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

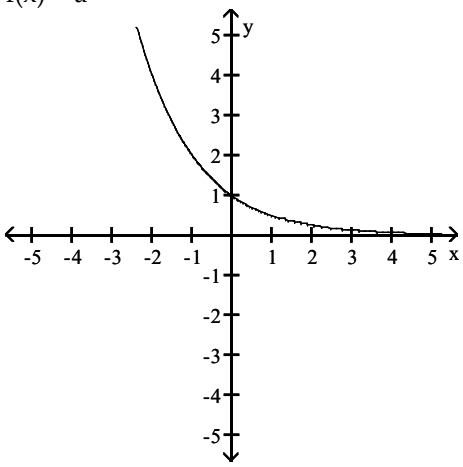
333) True or False. The function $y = \frac{x^2 - 2^2}{x - 2}$ is continuous at $x = 2$.

A) True B) False

Answer: B

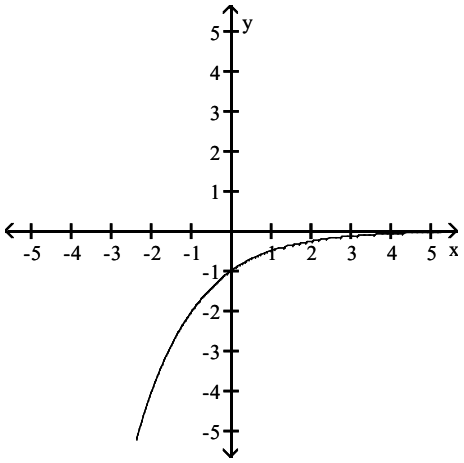
SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

334) $f(x) = a^x$



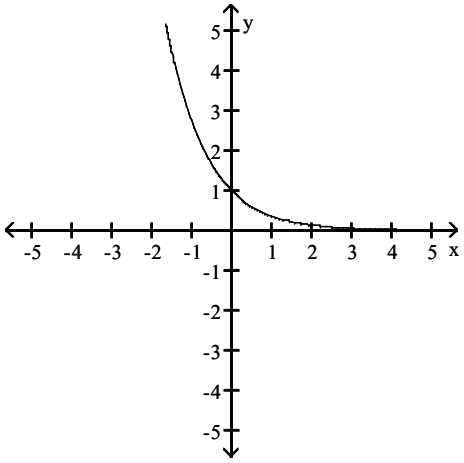
The graph of an exponential function with base a is given. Sketch the graph of $g(x) = -a^x$. Give the domain and range of g.

Answer:



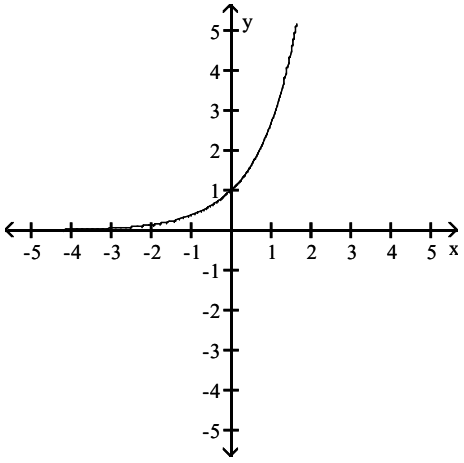
domain: $(-\infty, \infty)$, range: $(-\infty, 0)$

335) $f(x) = a^x$



The graph of an exponential function with base a is given. Sketch the graph of $h(x) = a^{-x}$. Give the domain and range of h.

Answer:



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

336) Explain how the graph of $y = 2^{x-4} + 3$ can be obtained from the graph of $y = 2^x$.

Answer: The graph is shifted 4 units to the right and 3 units up.

337) Explain how the graph of $y = (1/4)^x + 2$ can be obtained from the graph of $y = 4^x$.

Answer: The graph is reflected over the y-axis and then shifted 2 units up.

Answer Key
Testname: UNTITLED3

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

51) A
52) C
53) C
54) B
55) D
56) A
57) A
58) A
59) B
60) B
61) A
62) A
63) A
64) B
65) B
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67) B
68) A
69) A
70) C
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72) B
73) B
74) C
75) C
76) B
77) B
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79) B
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83) C
84) A
85) D
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87) D
88) C
89) A
90) B
91) D
92) A
93) B
94) B
95) D
96) D
97) C
98) D
99) C
100) D

Answer Key
Testname: UNTITLED3

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105) C
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107) D
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190) C
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192) A
193) D
194) A
195) A
196) D
197) B
198) A
199) D
200) C

Answer Key
Testname: UNTITLED3

201) D
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317) B
318) D
319) A
320) B
321) C
322) A
323) A
324) C
325) C
326) C
327) A
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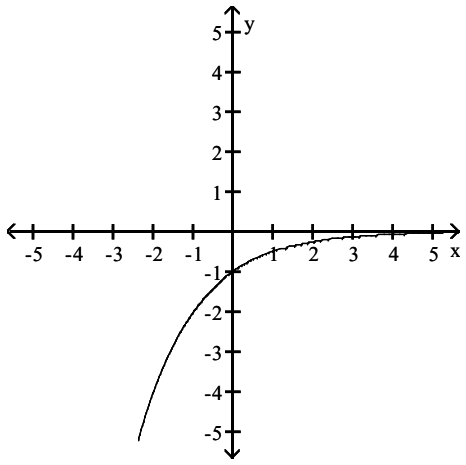
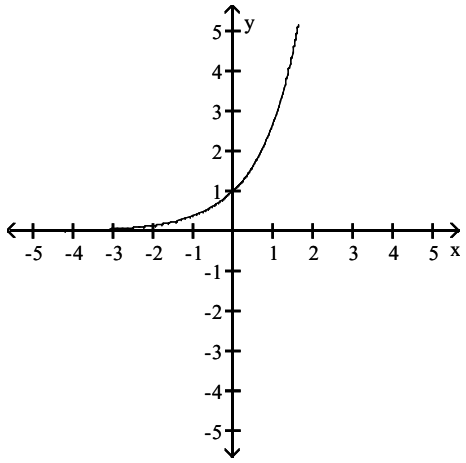
333) B

334)



domain: (−∞, ∞), range: (−∞, 0)

335)



domain: (−∞, ∞), range: (0, ∞)

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