Chapter 1

Find the domain and range of the function.

1) $f(x) = 7 - x^2$

A) D: $(-\infty, 7]$, R: $(-\infty, \infty)$
B) D: $(-\infty, \infty)$, R: $[7, \infty)$
C) D: $(-\infty, \infty)$, R: $(-\infty, 7]$
D) D: $(-\infty, \infty)$, R: $(-\infty, \infty)$

Answer: C

2) $F(t) = t^2 + 1$

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

Answer: B

3) $g(z) = 1 - \sqrt{z}$

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

Answer: D

4) $f(x) = -7 + \sqrt{x}$

A) D: $(-\infty, 0]$, R: $(-\infty, -7]$
B) D: $[0, \infty)$, R: $(-\infty, \infty)$
C) D: $[0, \infty)$, R: $[-7, \infty)$
D) D: $(-\infty, \infty)$, R: $[-7, \infty)$

Answer: C

5) $F(t) = \dfrac{6}{\sqrt{t}}$

A) D: $[0, \infty)$, R: $(-\infty, \infty)$
B) D: $(0, \infty)$, R: $(0, \infty)$
C) D: $(-\infty, \infty)$, R: $(-\infty, \infty)$
D) D: $(-\infty, 0)$, R: $(-\infty, 0)$

Answer: B

6) $g(z) = \dfrac{-9}{\sqrt{z + 1}}$

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

Answer: D

7) $f(x) = \dfrac{8}{3 + \sqrt{x}}$

A) D: $(-\infty, \infty)$, R: $\left(0, \dfrac{8}{3}\right]$
B) D: $[0, \infty)$, R: $(-\infty, \infty)$
C) D: $[0, \infty)$, R: $\left(0, \dfrac{8}{3}\right]$
D) D: $(-\infty, 0]$, R: $(-\infty, 0]$

Answer: C

8) $F(t) = \dfrac{4}{7\sqrt{t}}$

A) D: $(-\infty, \infty)$, R: $(-\infty, \infty)$
B) D: $[0, \infty)$, R: $[0, \infty)$
C) D: $(0, \infty)$, R: $(0, \infty)$
D) D: $(-\infty, 0)$, R: $(-\infty, 0)$

Answer: C

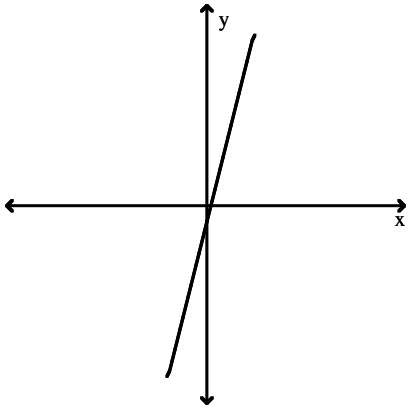
9) $g(z) = \sqrt{1 - z^2}$

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

Answer: A

Determine whether or not the graph is a graph of a function of x.

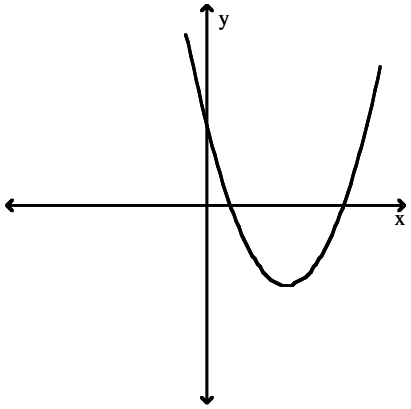
10)



A) Function
B) Not a function

Answer: A

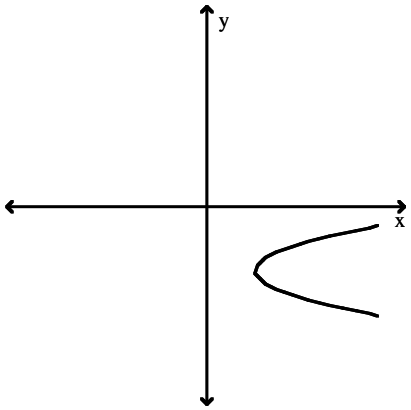
11)



A) Function
B) Not a function

Answer: A

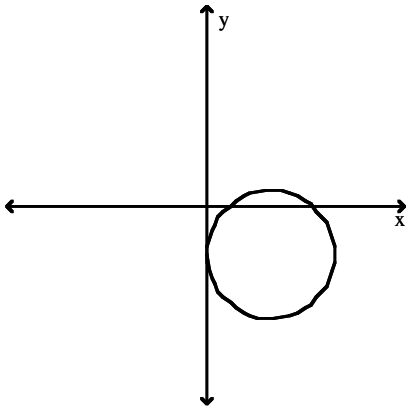
12)



A) Function B) Not a function

Answer: B

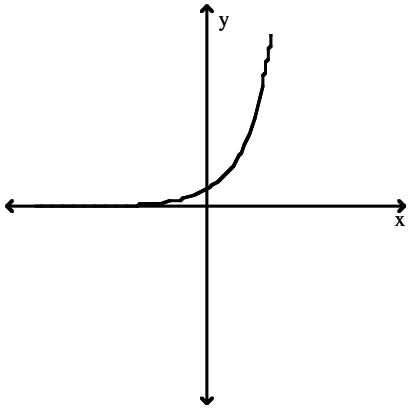
13)



A) Function B) Not a function

Answer: B

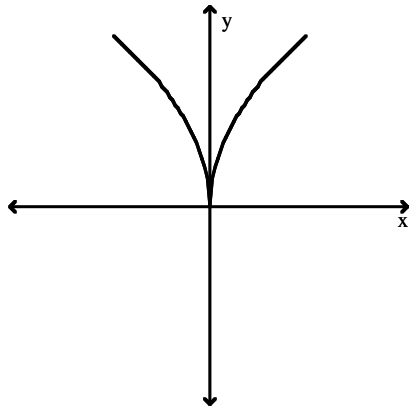
14)



A) Function B) Not a function

Answer: A

15)



A) Function B) Not a function

Answer: A

Find the formula for the function.

16) Express the perimeter of a square as a function of the square's side length x.

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

Answer: C

17) Express the area of a square as a function of its side length x.

A) $A = 2x$ B) $A = x^4$ C) $A = x^2$ D) $A = 4x$

Answer: C

18) Express the length d of a square's diagonal as a function of its side length x.

A) $d = 2x$ B) $d = x$ C) $d = x\sqrt{3}$ D) $d = x\sqrt{2}$

Answer: D

19) Express the perimeter of an isosceles triangle with side lengths x, 5x, and 5x as a function of the side length.

A) $p = 10x^3$ B) $p = 25x^3$ C) $p = 10x$ D) $p = 11x$

Answer: D

20) Express the area of a circle as a function of its radius r.

A) $A = 2\pi r$ B) $A = \pi r^2$ C) $A = \pi r^3$ D) $A = \pi r$

Answer: B

21) Express the volume of a sphere as a function of its radius r.

A) $V = \frac{3}{4}\pi r^3$ B) $V = \frac{4}{3}\pi r^3$ C) $V = \pi r^3$ D) $V = \frac{2}{3}\pi r^2$

Answer: B

22) A point P in the first quadrant lies on the graph of the function $f(x) = x^2$. Express the slope of the line joining P to the origin as a function of x.

A) $m = x$ B) $m = 2x$ C) $m = \frac{2}{x}$ D) $m = \frac{1}{x}$

Answer: A

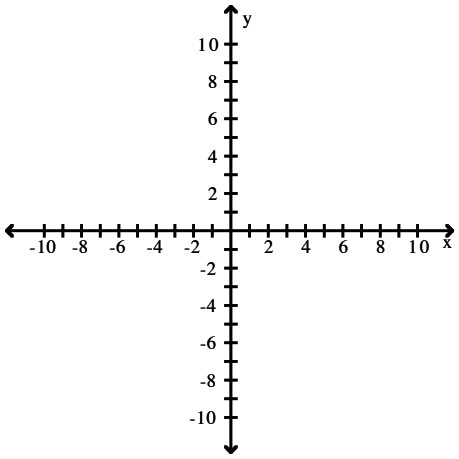
23) A point P in the fourth quadrant lies on the graph of the function $f(x) = -x^2$. Express the slope of the line joining P to the origin as a function of x.

A) $m = -2x$ B) $m = -x$ C) $m = \frac{1}{x}$ D) $m = x$

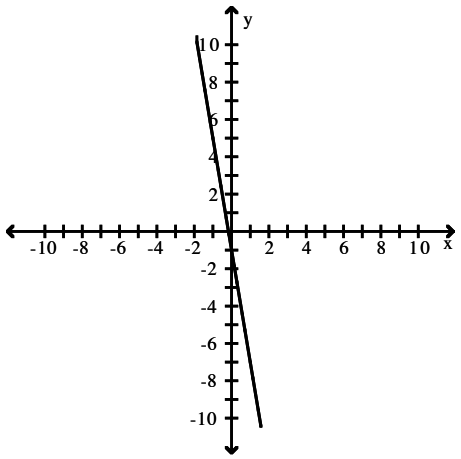
Answer: B

Find the domain and graph the function.

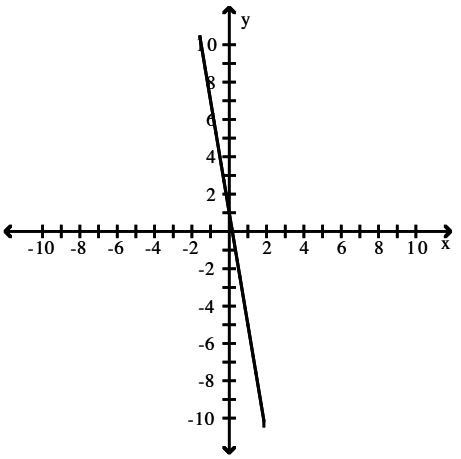
24) $f(x) = -6x - 1$



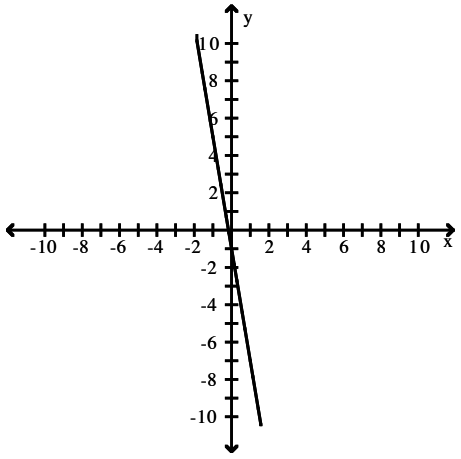
A) D: $[0, \infty)$



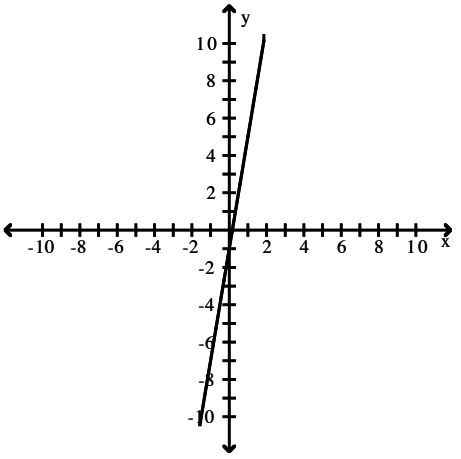
B) D: $(-\infty, \infty)$



C) D: $(-\infty, \infty)$

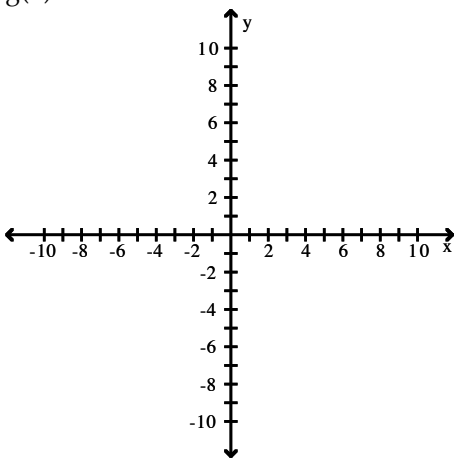


D) D: $(-\infty, \infty)$

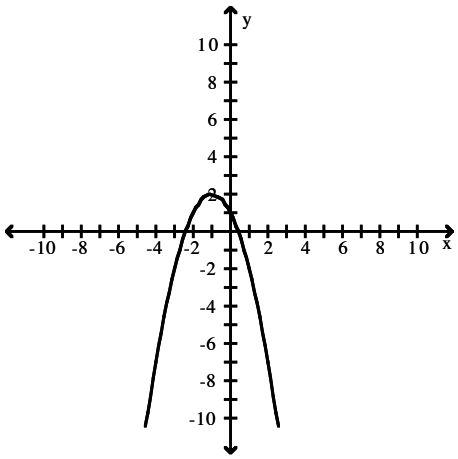


Answer: C

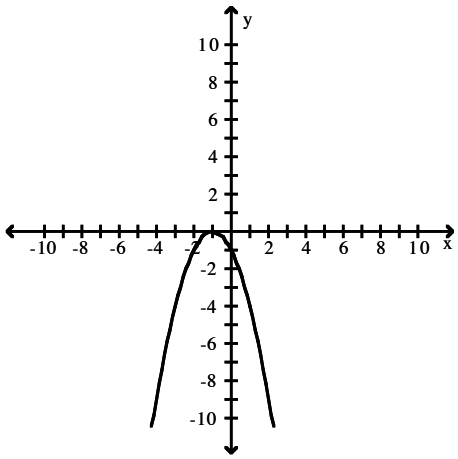
25) $g(x) = -1 - 2x - x^2$



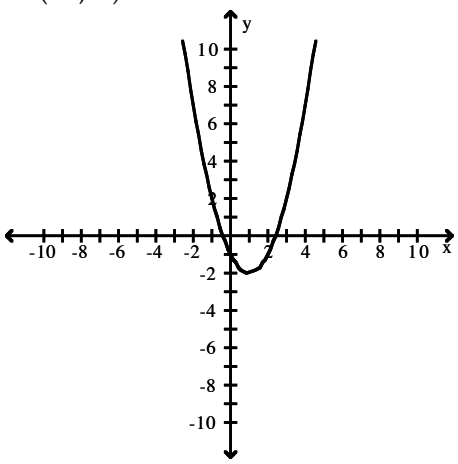
A) D: $(-\infty, \infty)$



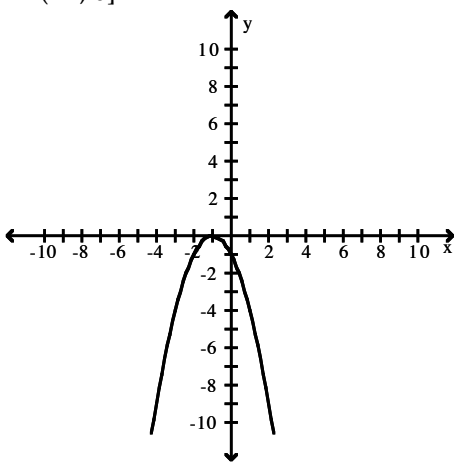
B) D: $(-\infty, \infty)$



C) D: $(-\infty, \infty)$

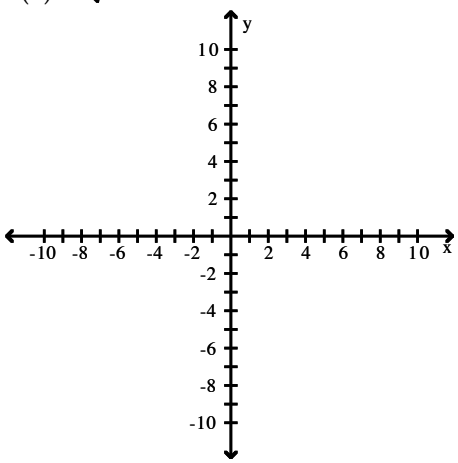


D) D: $(-\infty, 0]$

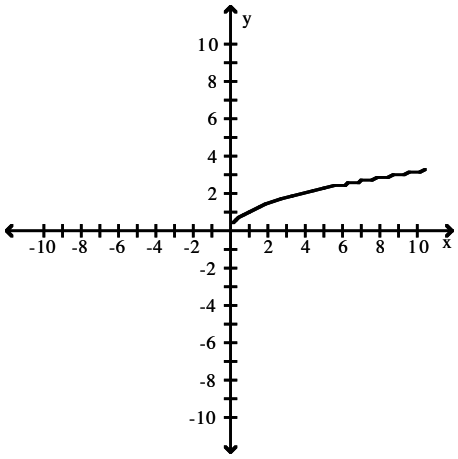


Answer: B

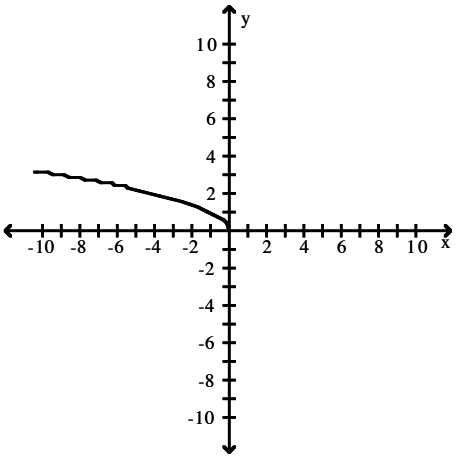
26) $F(x) = \sqrt{-x}$



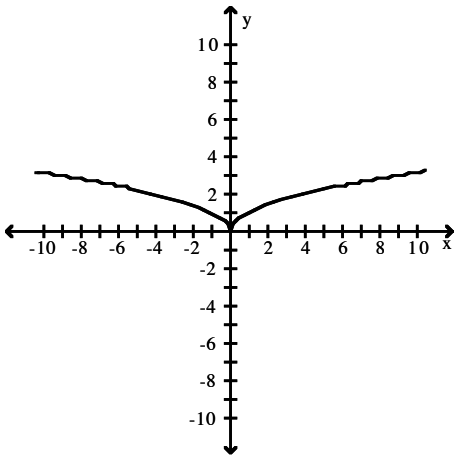
A) D: $[0, \infty)$



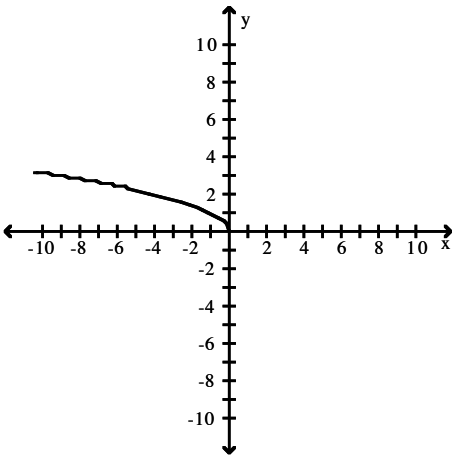
B) D: $(-\infty, 0)$



C) D: $(-\infty, \infty)$

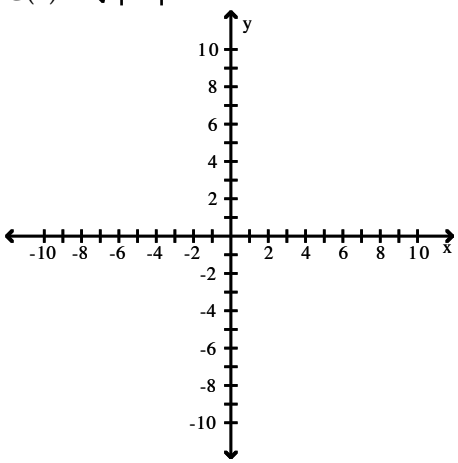


D) D: $(-\infty, 0]$

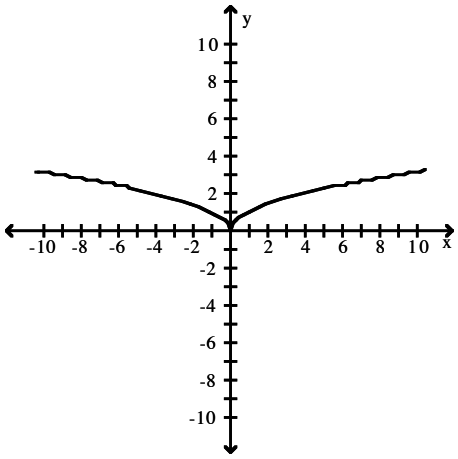


Answer: D

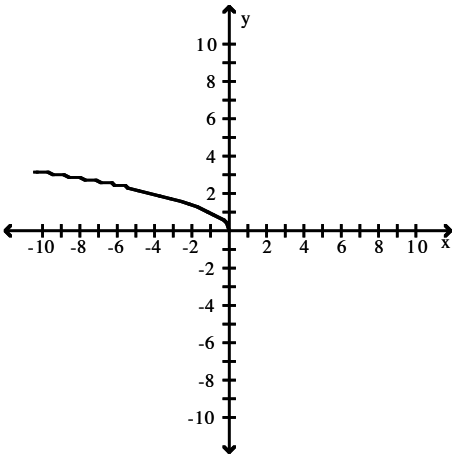
27) $G(x) = \sqrt{|x|}$



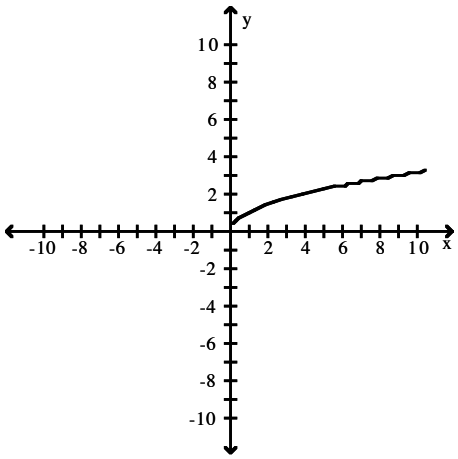
A) D: $(-\infty, \infty)$



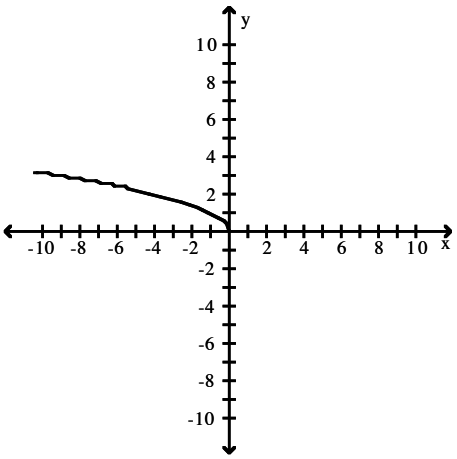
B) D: $(-\infty, 0]$



C) D: $[0, \infty)$

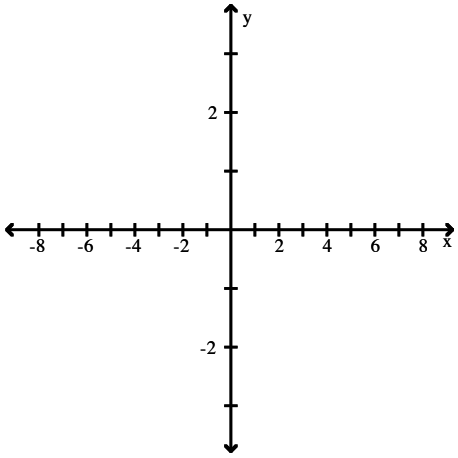


D) D: $(-\infty, 0)$

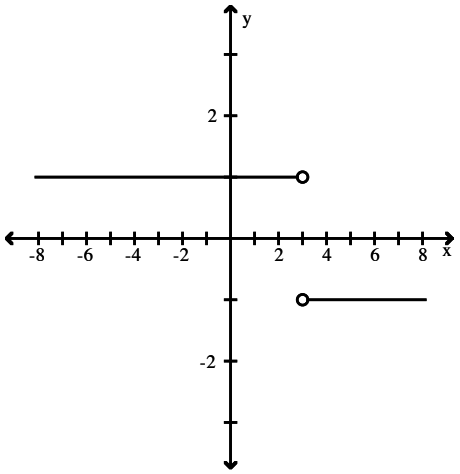


Answer: A

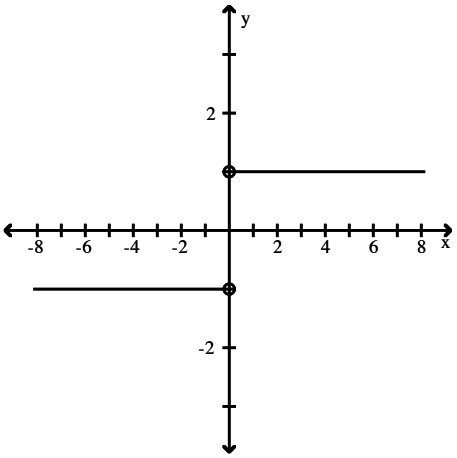
28) $F(t) = \dfrac{|t-3|}{t-3}$



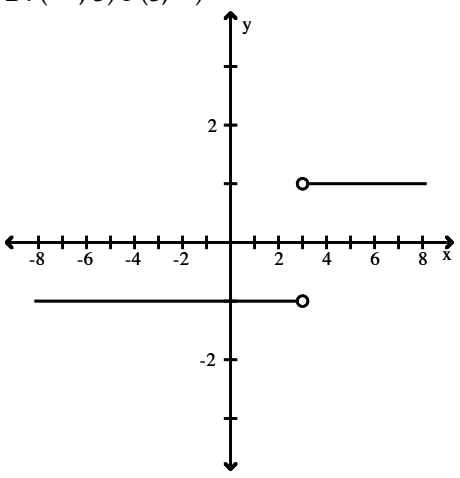
A) D: $(-\infty, 3) \cup (3>, \infty)$



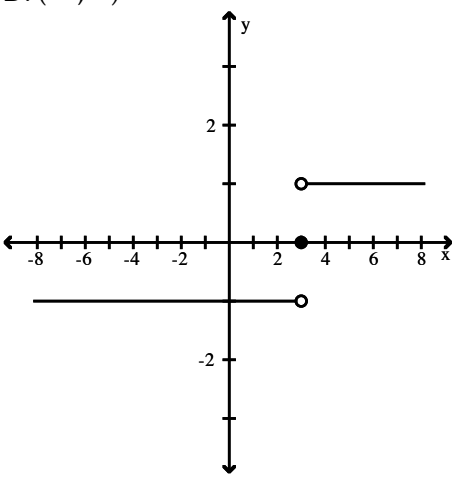
B) D: $(-\infty, 0) \cup (0, \infty)$



C) D: $(-\infty, 3) \cup (3, \infty)$

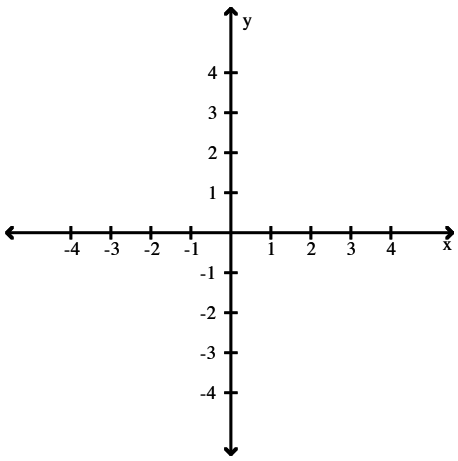


D) D: $(-\infty, \infty)$

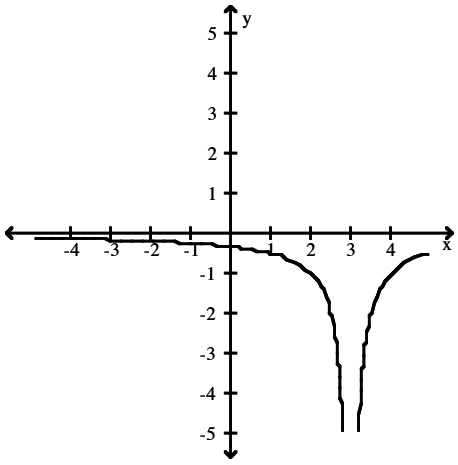


Answer: C

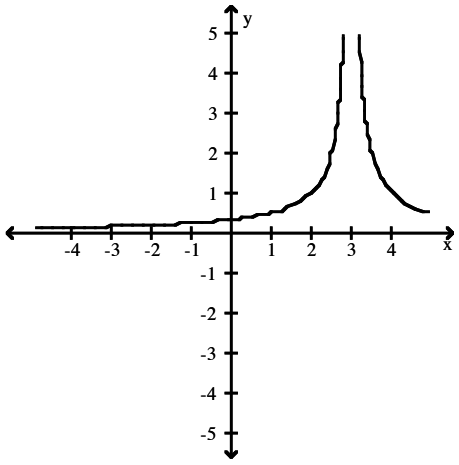
29) $G(t) = \dfrac{1}{|\,t - 3\,|}$



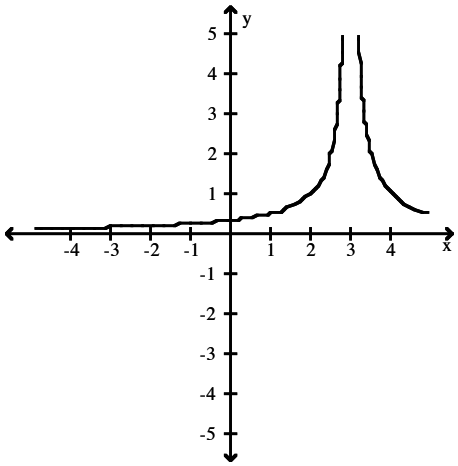
A) D: $(-\infty, 3) \cup (3, \infty)$



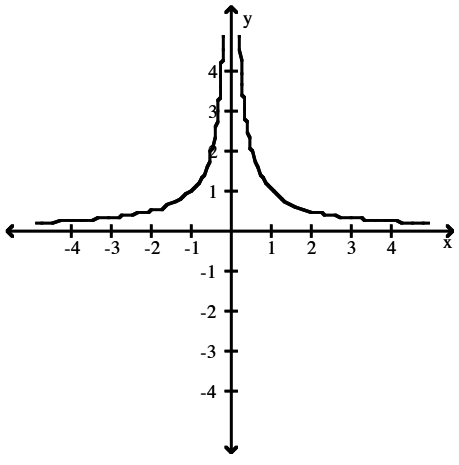
B) D: $(-\infty, \infty)$



C) D: $(-\infty, 3) \cup (3, \infty)$



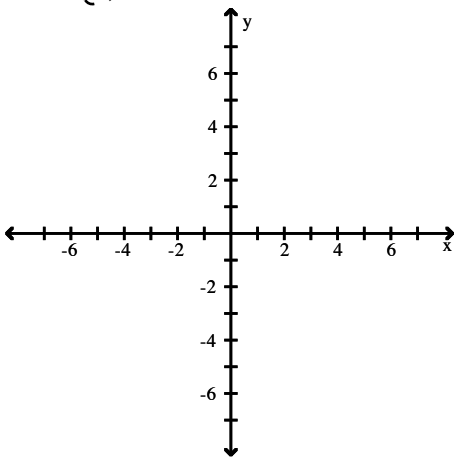
D) D: $(-\infty, 0) \cup (0, \infty)$



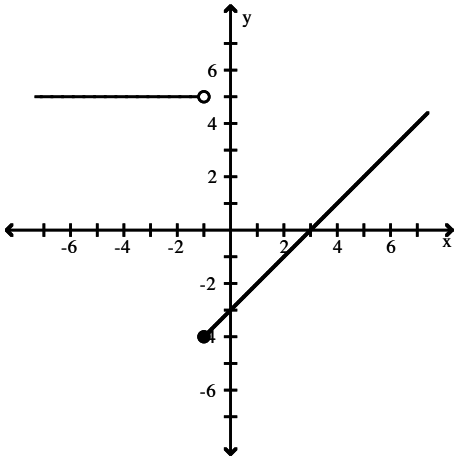
Answer: C

Graph the function.

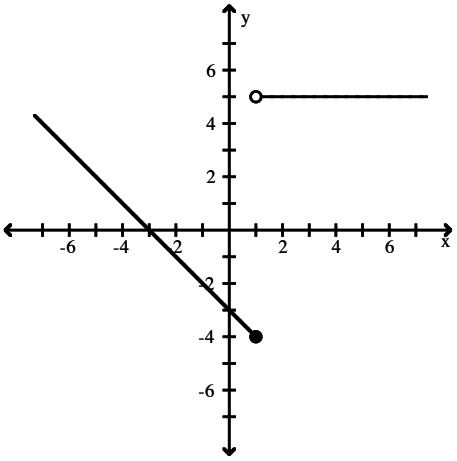
30) $f(x) = \begin{cases} -3 - x, & x < 1 \\ 5, & x \geq 1 \end{cases}$



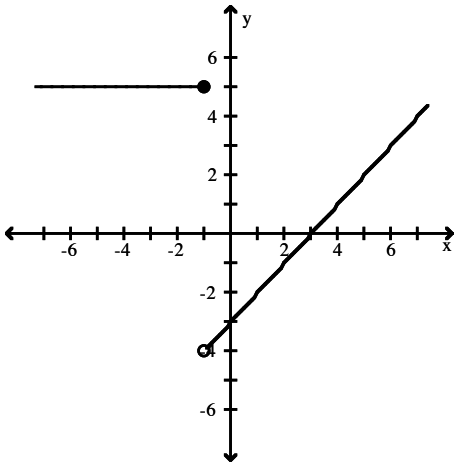
A)



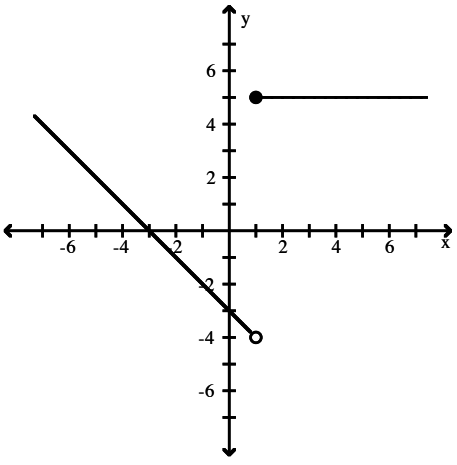
B)



C)

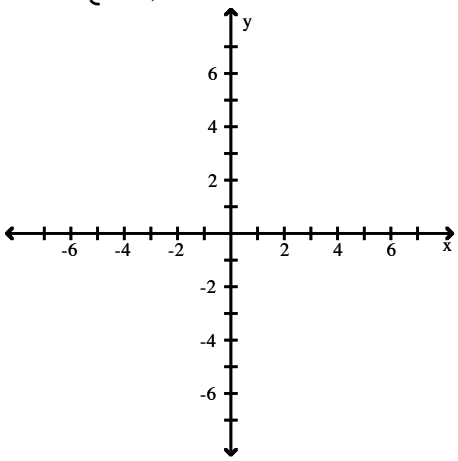


D)

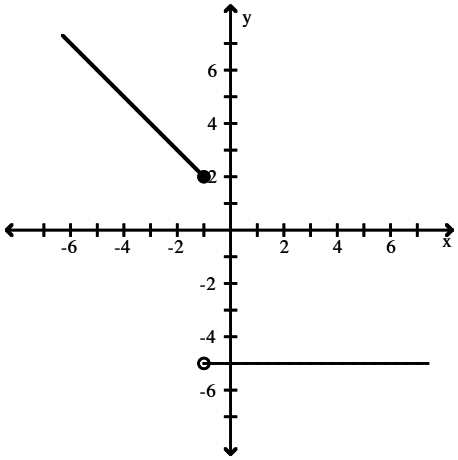


Answer: D

31) $g(x) = \begin{cases} -5 & x \le 0 \\ x + 2, & x > 0 \end{cases}$



A)



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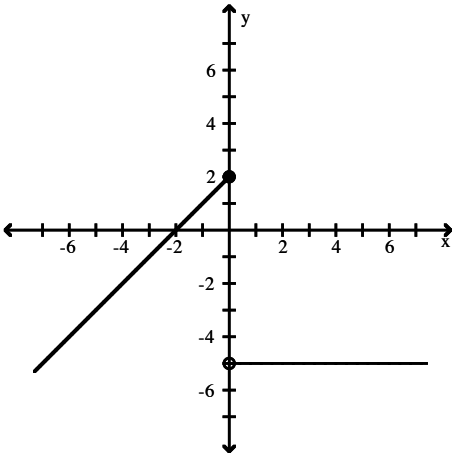
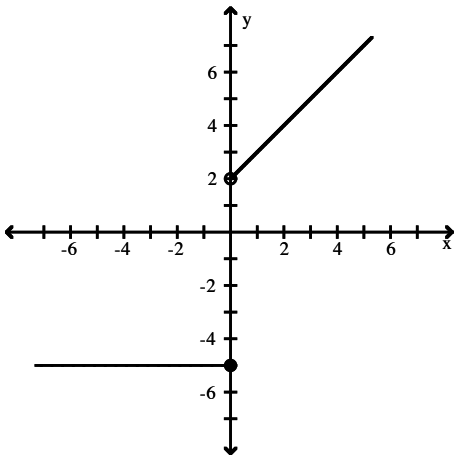
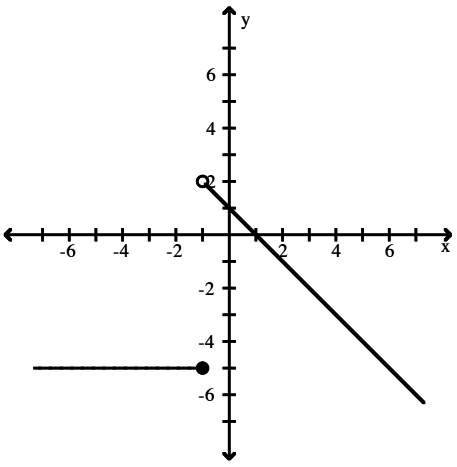


C)

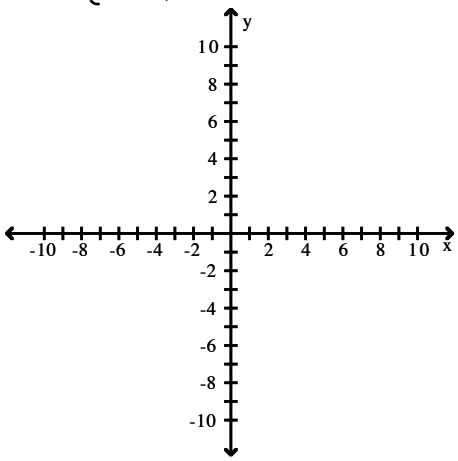


D)

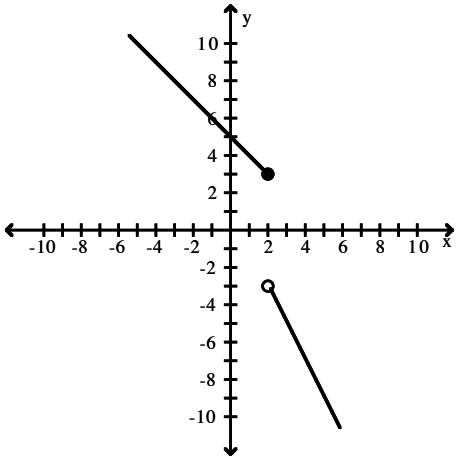


Answer: C

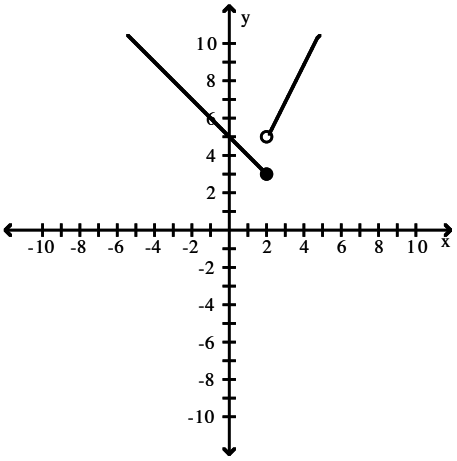
32) $F(x) = \begin{cases} 5 - x, & x \le 2 \\ 1 + 2x, & x > 2 \end{cases}$



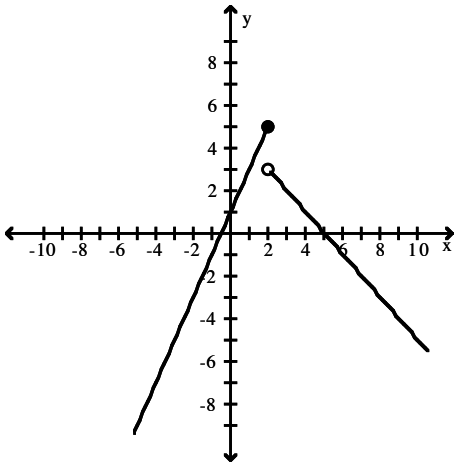
A)



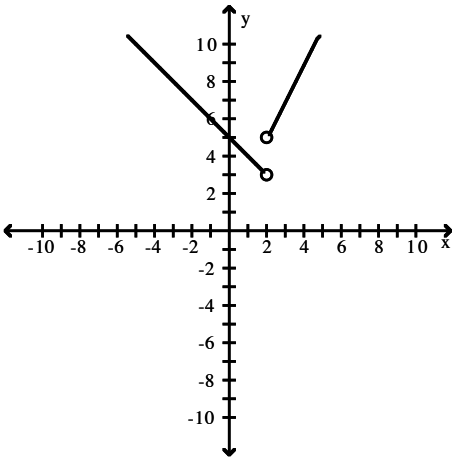
B)



C)

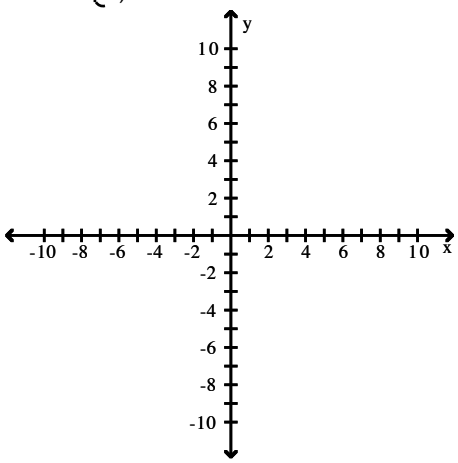


D)

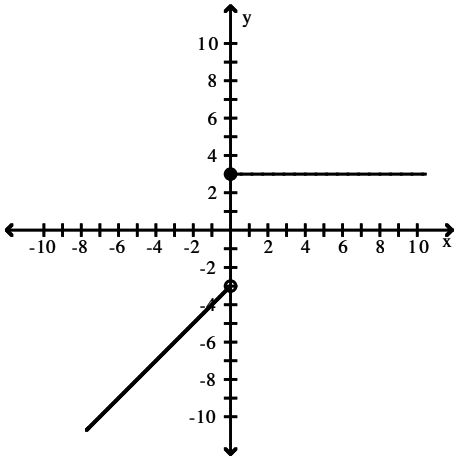


Answer: B

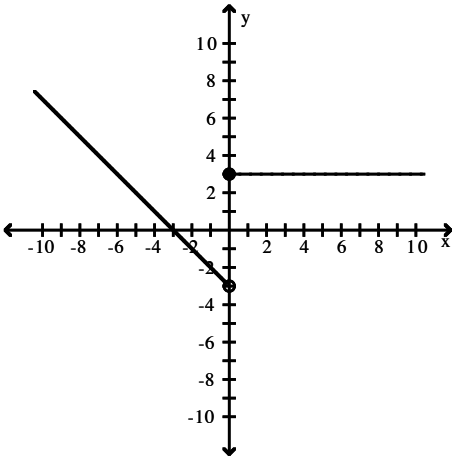
33) $G(x) = \begin{cases} |x| + 3, & x < 0 \\ 3, & x \geq 0 \end{cases}$



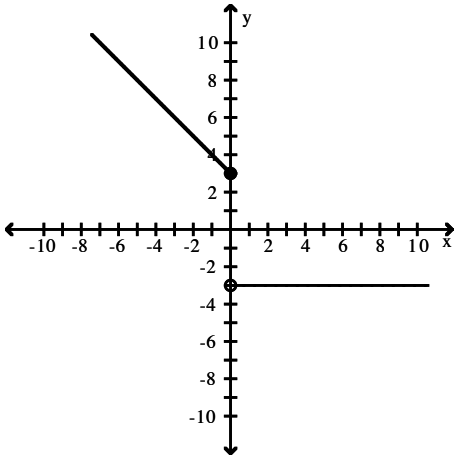
A)



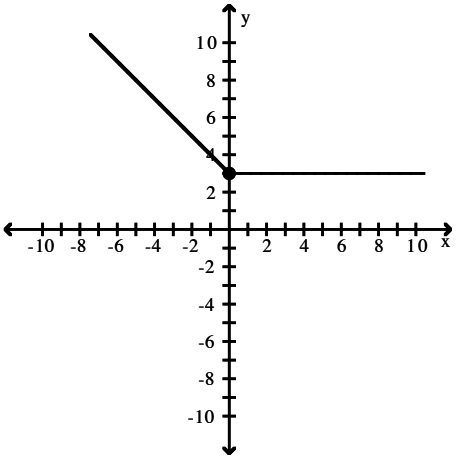
B)



C)

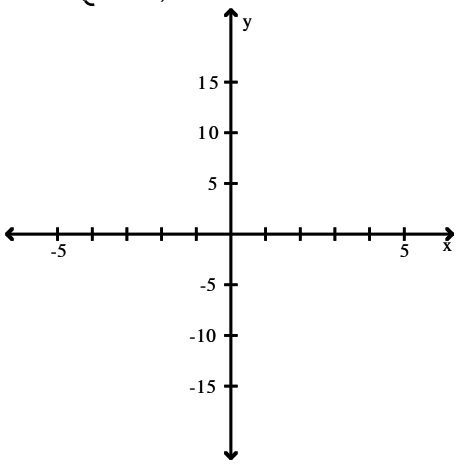


D)

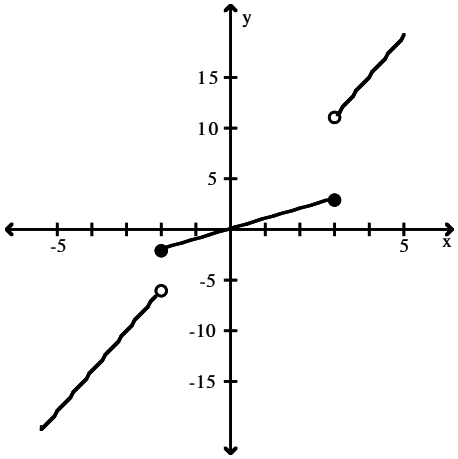


Answer: D

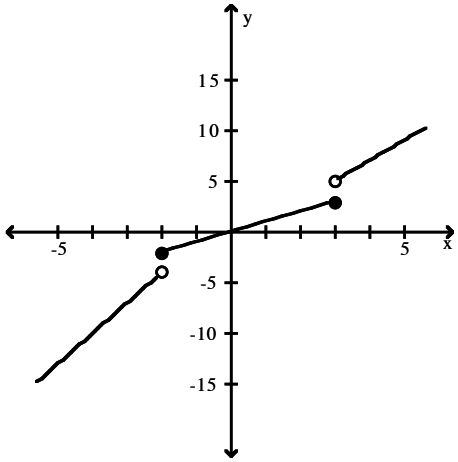
34) $f(x) = \begin{cases} 3x + 2, & x < -2 \\ x, & -2 \le x \le 3 \\ 2x - 1, & x > 3 \end{cases}$



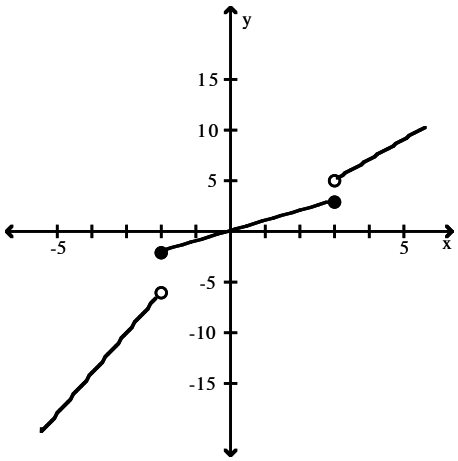
A)



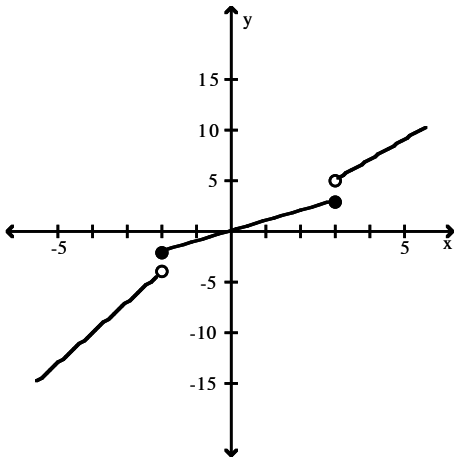
B)



C)

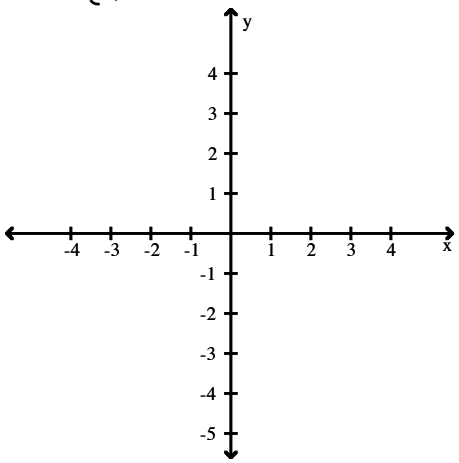


D)

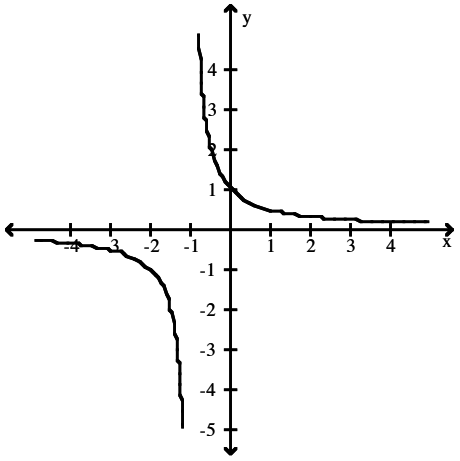


Answer: B

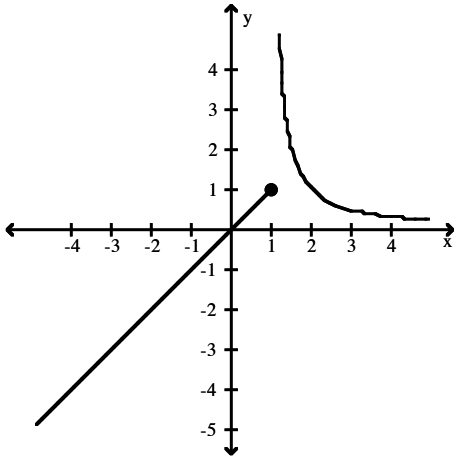
35) $g(x) = \begin{cases} \dfrac{1}{x-1}, & x < 1 \\ x, & x \geq 1 \end{cases}$



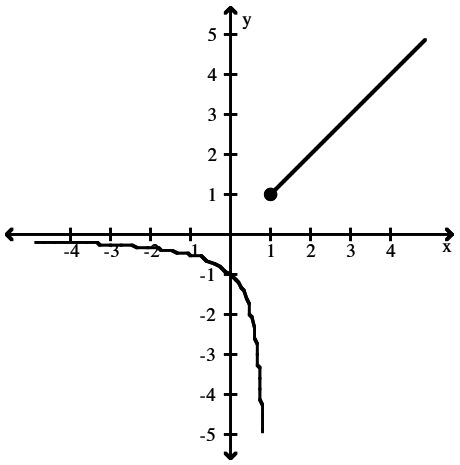
A)



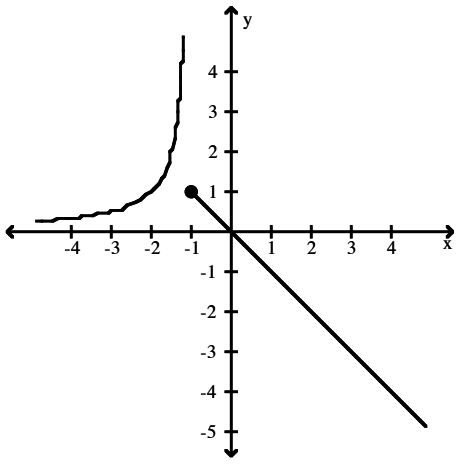
B)



C)



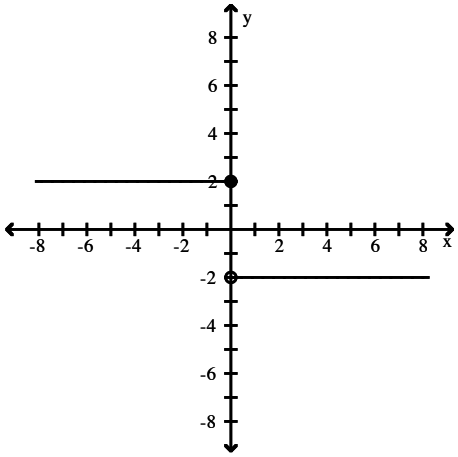
D)



Answer: C

Find a formula for the function graphed.

36)



A) $f(x) = \begin{cases} 2x, & x \le 0 \\ -2x, & x > 0 \end{cases}$

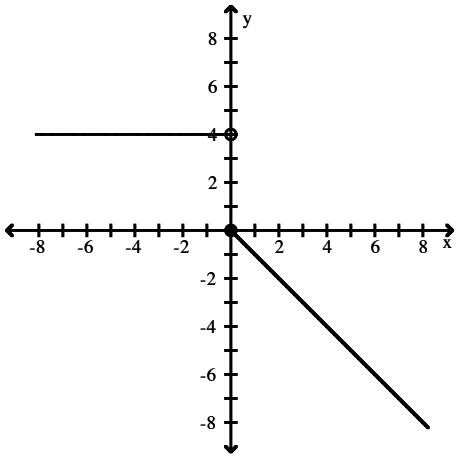
B) $f(x) = \begin{cases} -2, & x \le 0 \\ 2, & x > 0 \end{cases}$

C) $f(x) = \begin{cases} 2, & x < 0 \\ -2, & x \ge 0 \end{cases}$

D) $f(x) = \begin{cases} 2, & x \le 0 \\ -2, & x > 0 \end{cases}$

Answer: D

37)



A) $f(x) = \begin{cases} 4, & x < 0 \\ x, & x \ge 0 \end{cases}$

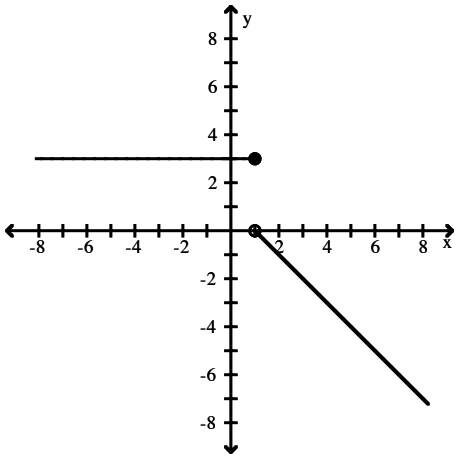
B) $f(x) = \begin{cases} 4, & x < 0 \\ -4x, & x \ge 0 \end{cases}$

C) $f(x) = \begin{cases} 4, & x < 0 \\ -x, & x \ge 0 \end{cases}$

D) $f(x) = \begin{cases} 4, & x \le 0 \\ -x, & x > 0 \end{cases}$

Answer: C

38)



A) $f(x) = \begin{cases} 3, & x < 1 \\ x - 1, & x \geq 1 \end{cases}$

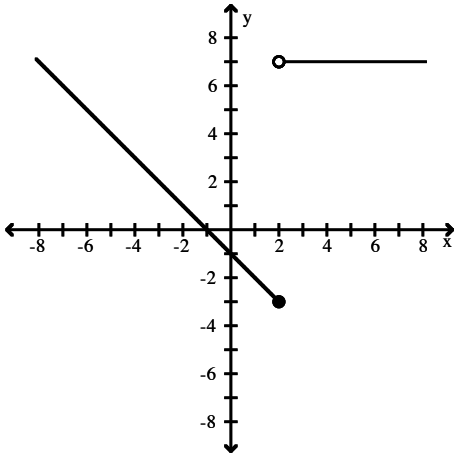
B) $f(x) = \begin{cases} 3, & x < 0 \\ 1 - x, & x \geq 0 \end{cases}$

C) $f(x) = \begin{cases} 3, & x < 1 \\ 1 - x, & x > 1 \end{cases}$

D) $f(x) = \begin{cases} 3, & x \leq 1 \\ 1 - x, & x > 1 \end{cases}$

Answer: D

39)



A) $f(x) = \begin{cases} -1 + x, & x < 2 \\ 7 & x > 2 \end{cases}$

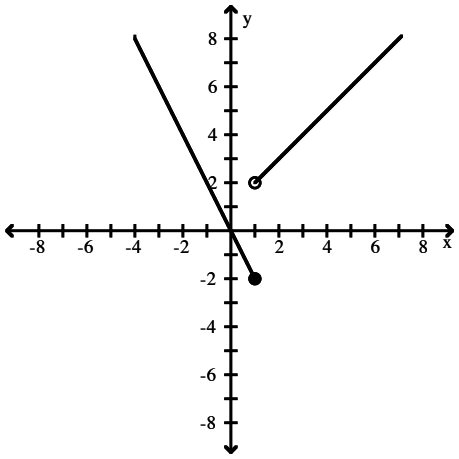
B) $f(x) = \begin{cases} -1 - x, & x < 2 \\ 7 & x \geq 2 \end{cases}$

C) $f(x) = \begin{cases} -1 + x, & x \leq 2 \\ 7 & x > 2 \end{cases}$

D) $f(x) = \begin{cases} -1 - x, & x \leq 2 \\ 7 & x > 2 \end{cases}$

Answer: D

40)



A) $f(x) = \begin{cases} x, & x \le 1 \\ 2x + 1, & x > 1 \end{cases}$

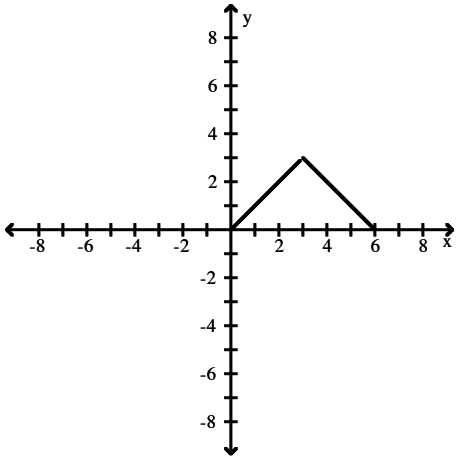
B) $f(x) = \begin{cases} 2x, & x \le 1 \\ x + 1, & x > 1 \end{cases}$

C) $f(x) = \begin{cases} -2x, & x \le 1 \\ x + 2, & x > 1 \end{cases}$

D) $f(x) = \begin{cases} -2x, & x \le 1 \\ x + 1, & x > 1 \end{cases}$

Answer: D

41)



A) $f(x) = \begin{cases} -x, & 0 \le x \le 3 \\ x + 6, & 3 < x \le 6 \end{cases}$

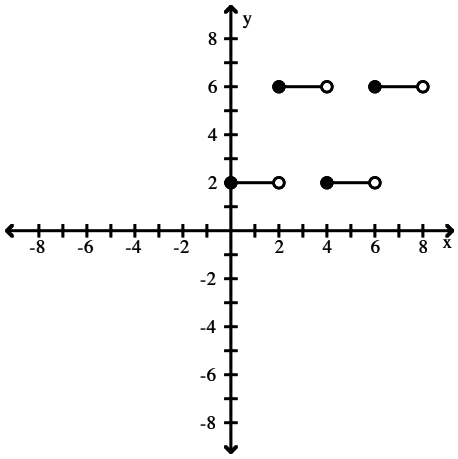
B) $f(x) = \begin{cases} x + 6, & 0 \le x \le 3 \\ -x, & 3 < x \le 6 \end{cases}$

C) $f(x) = \begin{cases} 6 - x, & 0 \le x \le 3 \\ x, & 3 < x \le 6 \end{cases}$

D) $f(x) = \begin{cases} x, & 0 \le x \le 3 \\ 6 - x, & 3 < x \le 6 \end{cases}$

Answer: D

42)



A) $f(x) = \begin{cases} 2, & 0 \le x < 2 \\ 6, & 2 \le x < 4 \\ 2, & 4 \le x < 6 \\ 6, & 6 \le x < 8 \end{cases}$

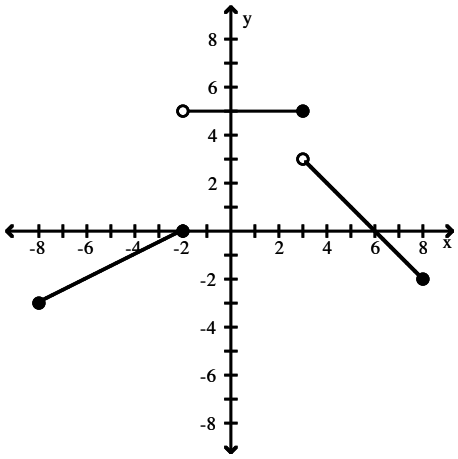
B) $f(x) = \begin{cases} 2, & 0 \le x \le 2 \\ 6, & 2 < x \le 4 \\ 2, & 4 < x \le 6 \\ 6, & 6 < x \le 8 \end{cases}$

C) $f(x) = \begin{cases} 6, & 0 \le x < 6 \\ 2, & 2 \le x < 8 \end{cases}$

D) $f(x) = \begin{cases} 2, & 0 \le x < 6 \\ 6, & 2 \le x < 8 \end{cases}$

Answer: A

43)



A) $f(x) = \begin{cases} \frac{1}{2}x + 1, & -8 \le x \le -2 \\ 5, & -2 < x \le 3 \\ 6 - x, & 3 < x \le 8 \end{cases}$

B) $f(x) = \begin{cases} \frac{1}{2}x + 1, & -8 \le x \le -2 \\ 5, & -2 < x < 3 \\ 6 - x, & 3 \le x \le 8 \end{cases}$

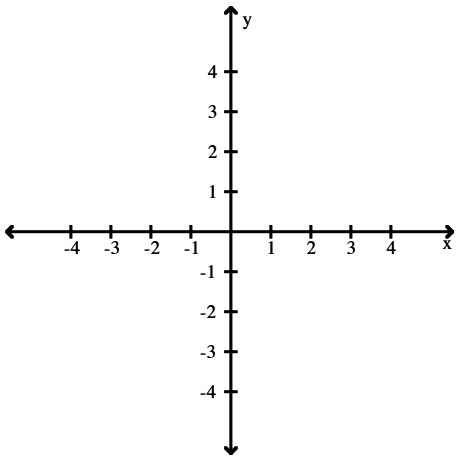
C) $f(x) = \begin{cases} -\frac{1}{2}x + 1, & -8 \le x \le -2 \\ 5, & -2 < x \le 3 \\ x - 6, & 3 < x \le 8 \end{cases}$

D) $f(x) = \begin{cases} \frac{1}{2}x + 1, & -8 < x \le -2 \\ 5, & -2 < x \le 3 \\ 6 - x, & 3 < x < 8 \end{cases}$

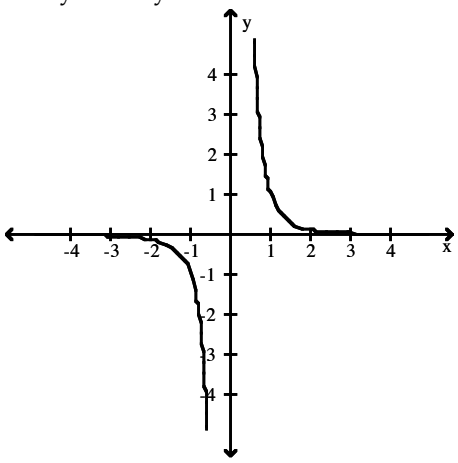
Answer: A

Graph the function. Determine the symmetry, if any, of the function.

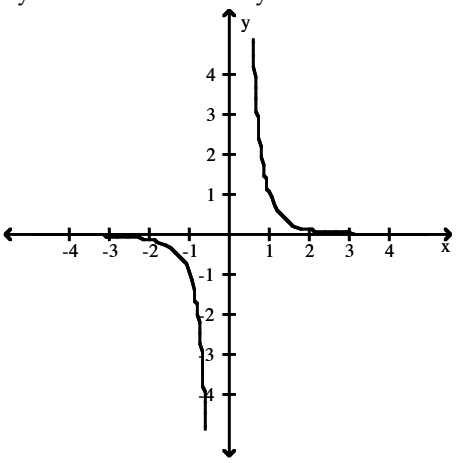
44) $y = \frac{1}{x^3}$



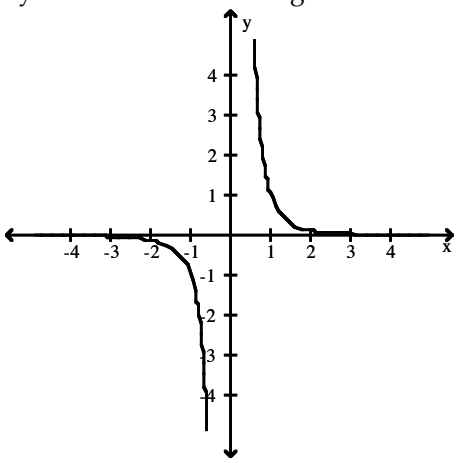
A) No symmetry



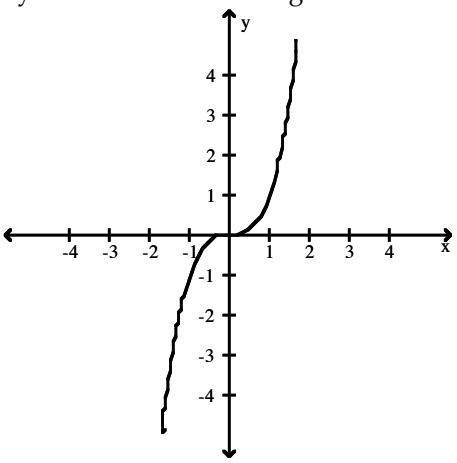
B) Symmetric about the y–axis



C) Symmetric about the origin

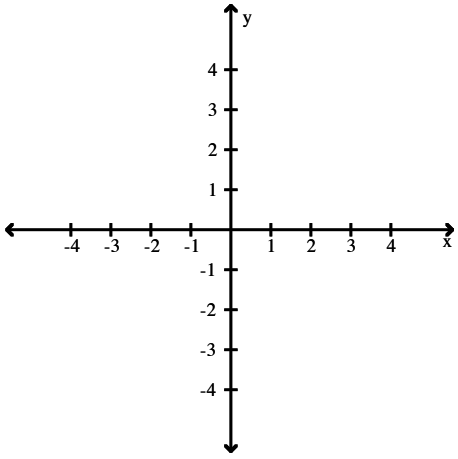


D) Symmetric about the origin

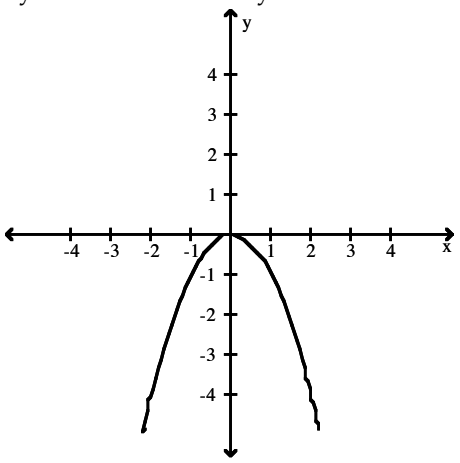


Answer: C

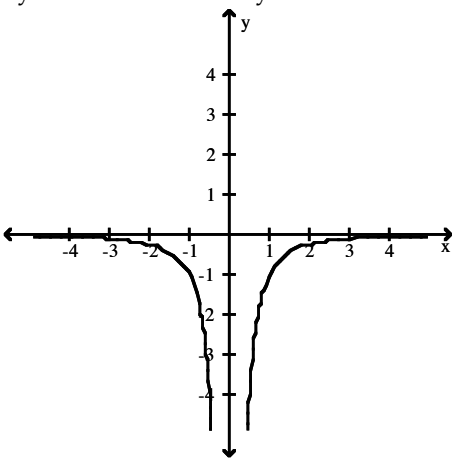
45) $y = -\frac{1}{x^2}$



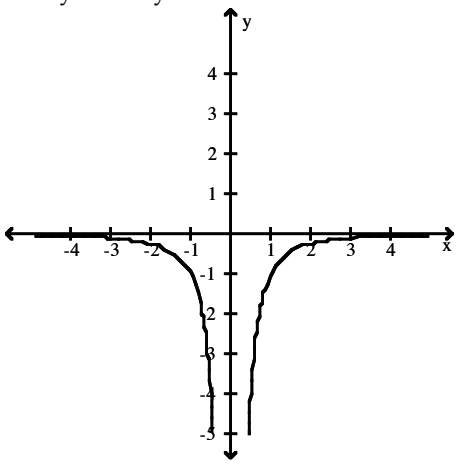
A) Symmetric about the y-axis



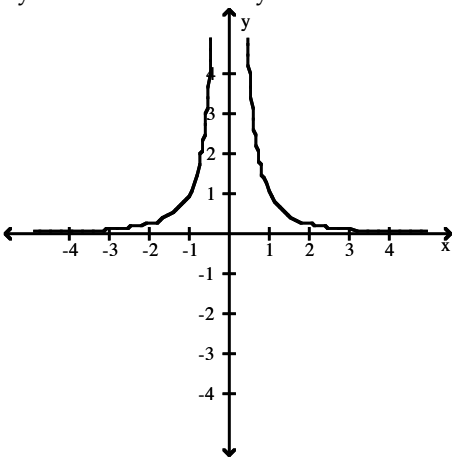
B) Symmetric about the y-axis



C) No symmetry

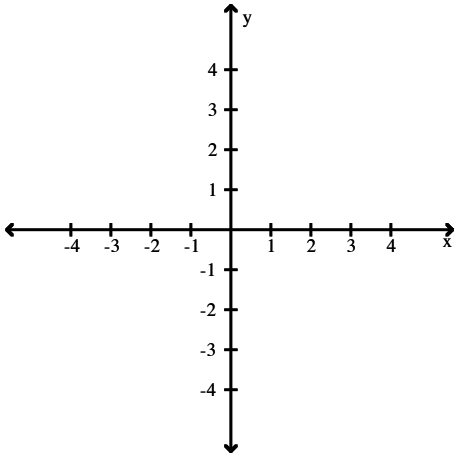


D) Symmetric about the y-axis

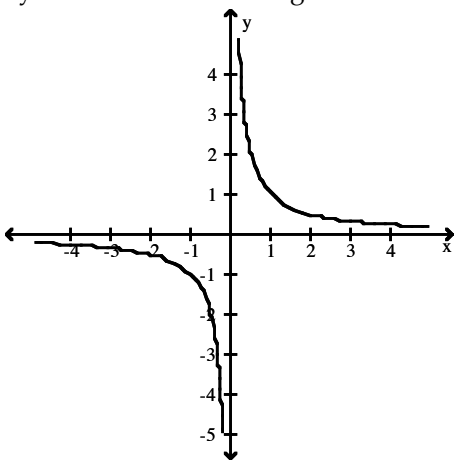


Answer: B

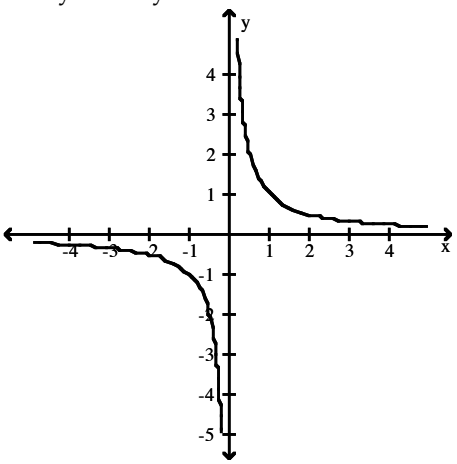
46) $y = \frac{1}{x}$



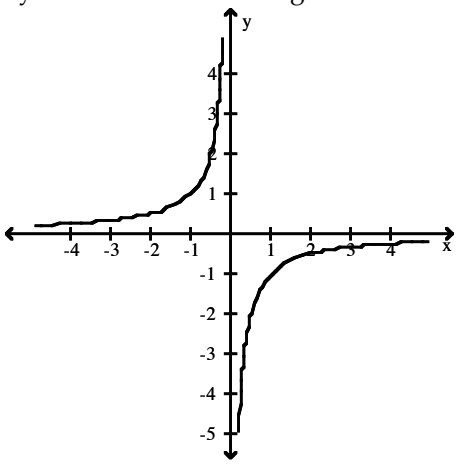
A) Symmetric about the origin



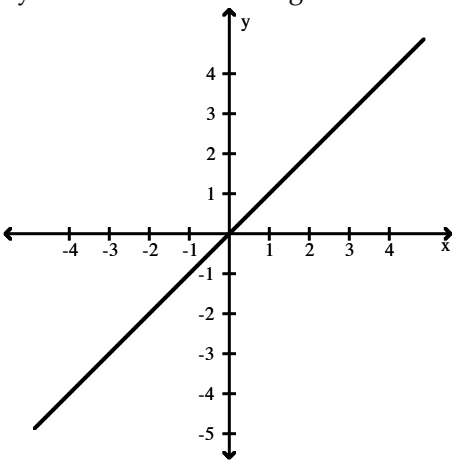
B) No symmetry



C) Symmetric about the origin

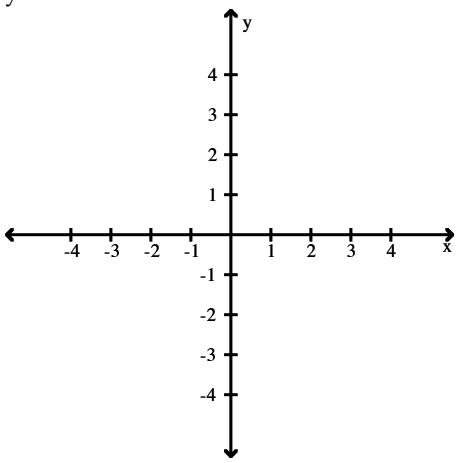


D) Symmetric about the origin

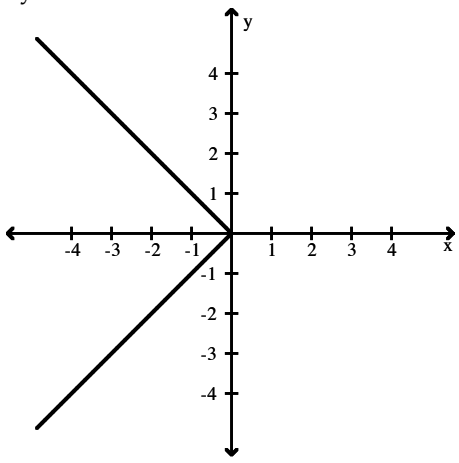


Answer: A

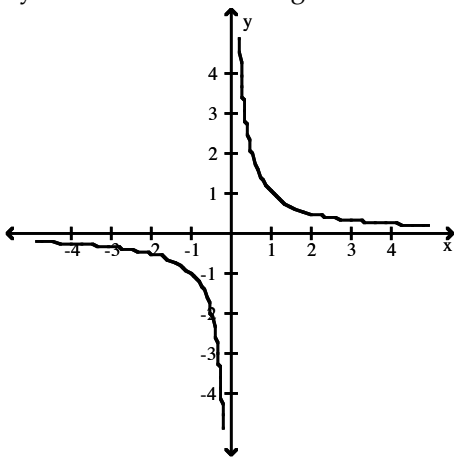
47) $y = -|x|$



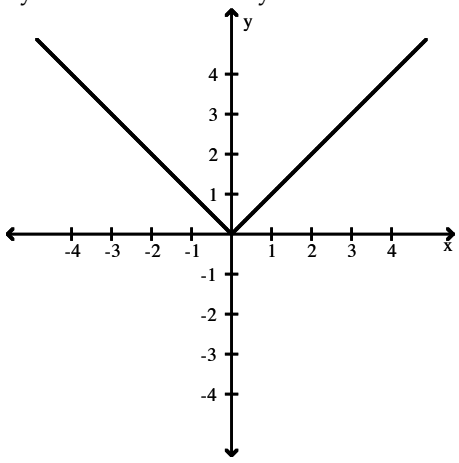
A) Symmetric about the x-axis



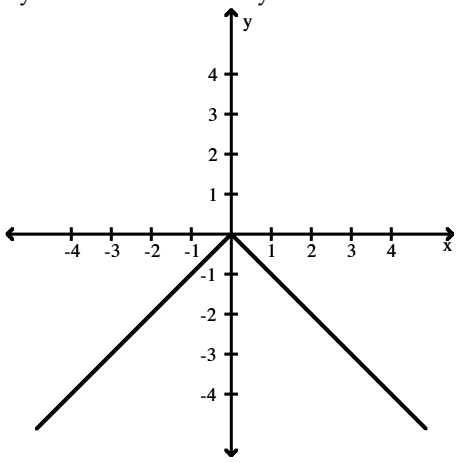
B) Symmetric about the origin



C) Symmetric about the y-axis

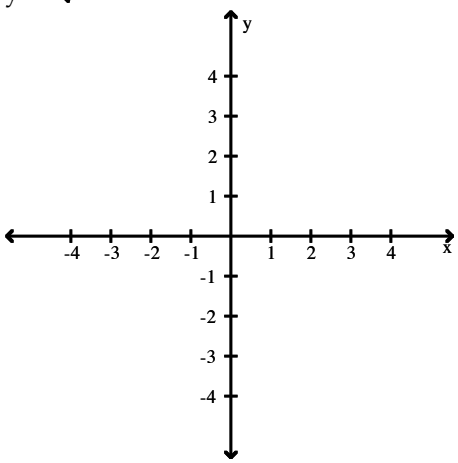


D) Symmetric about the y-axis

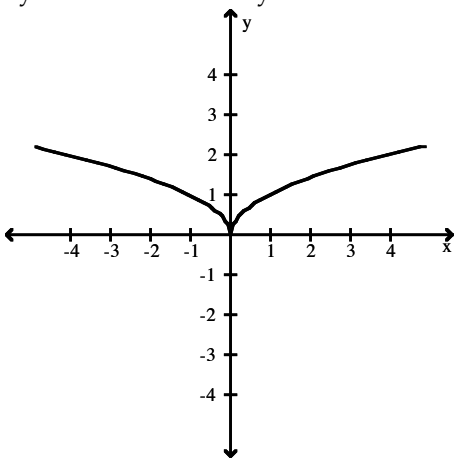


Answer: D

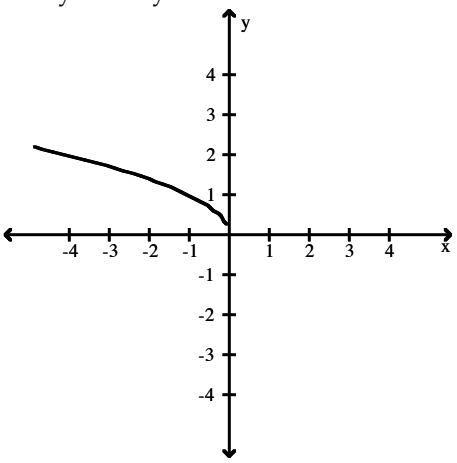
48) $y = \sqrt{-x}$



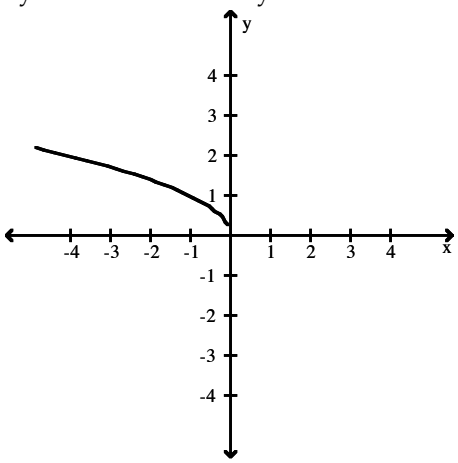
A) Symmetric about the y-axis



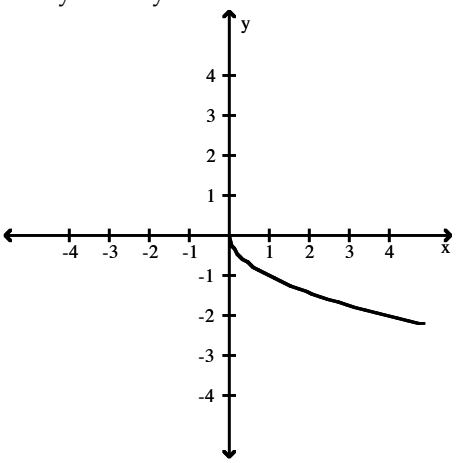
B) No symmetry



C) Symmetric about the y-axis

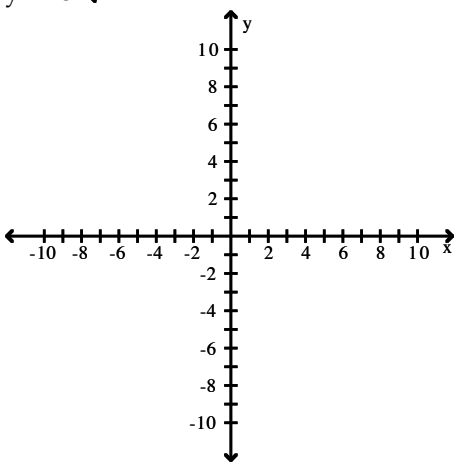


D) No symmetry

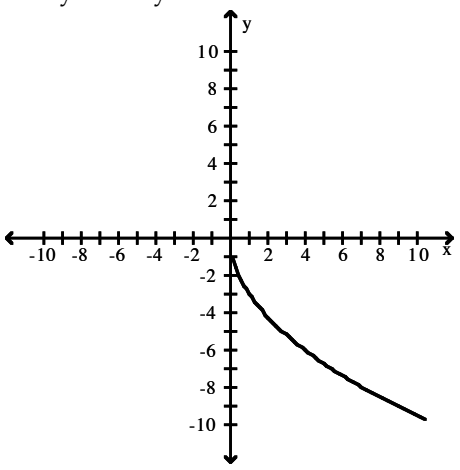


Answer: B

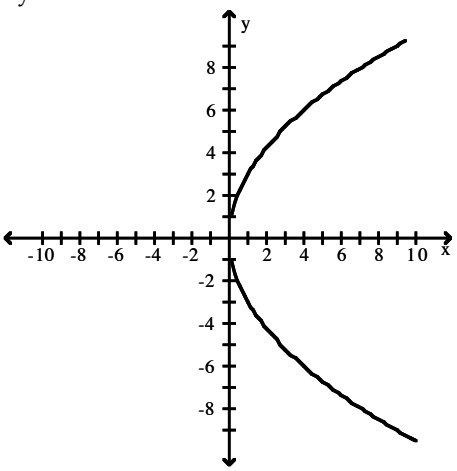
49) $y = -3\sqrt{x}$



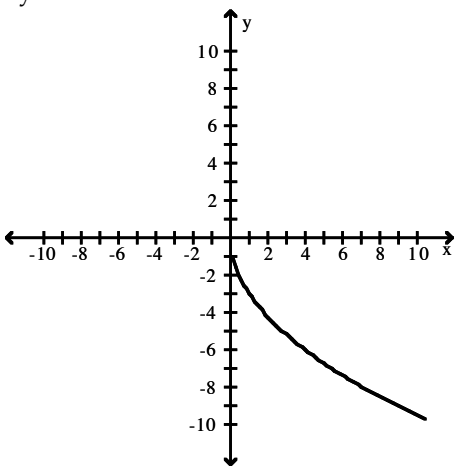
A) No symmetry



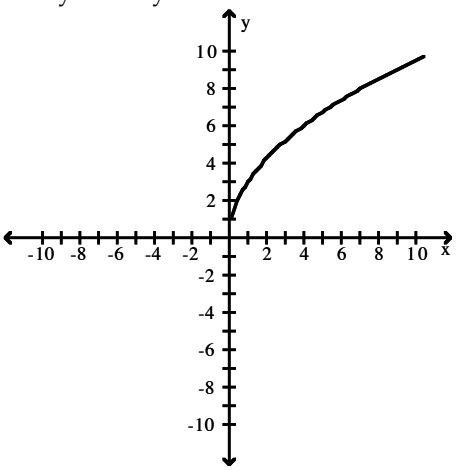
B) Symmetric about the x-axis



C) Symmetric about the x-axis

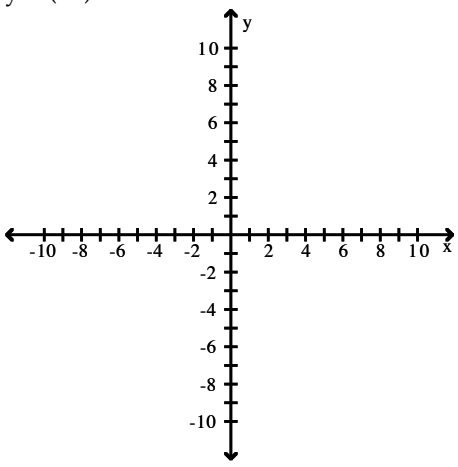


D) No symmetry

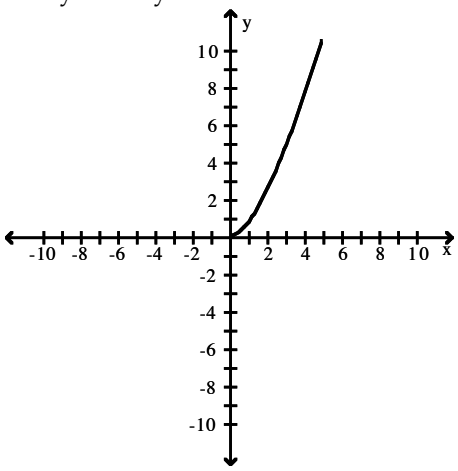


Answer: A

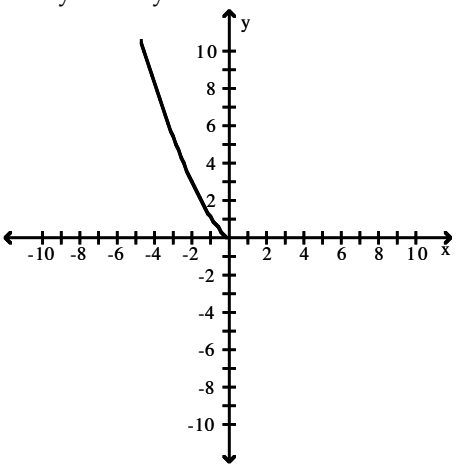
50) $y = (-x)^{3/2}$



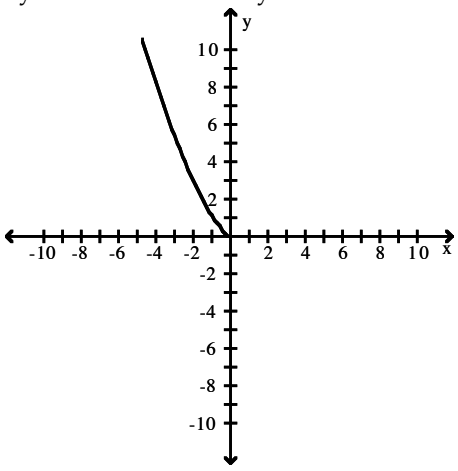
A) No symmetry



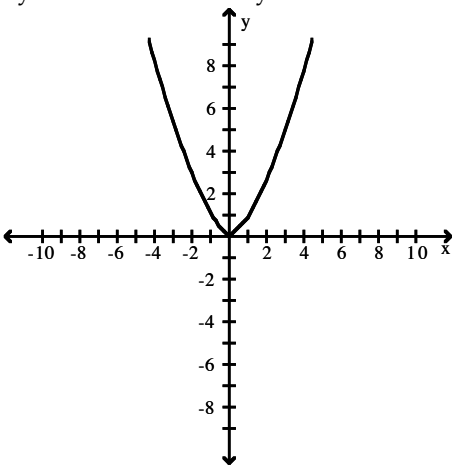
B) No symmetry



C) Symmetric about the y–axis

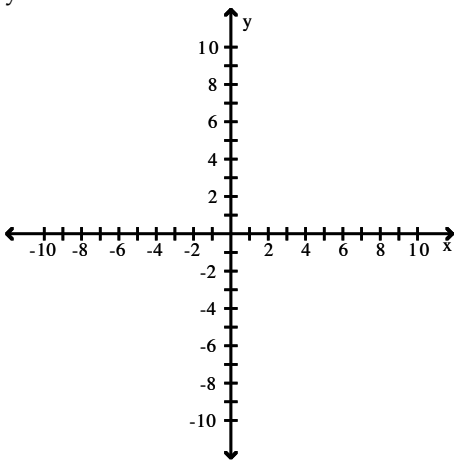


D) Symmetric about the y–axis

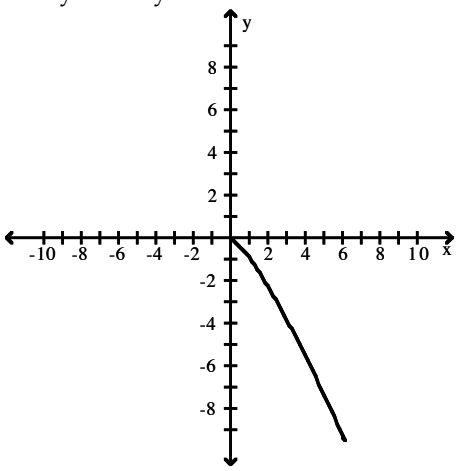


Answer: B

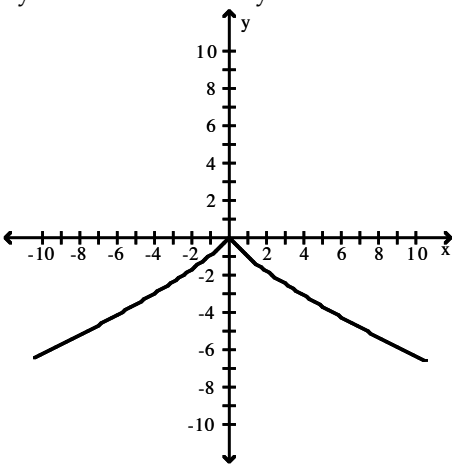
51) $y = -x^{4/5}$



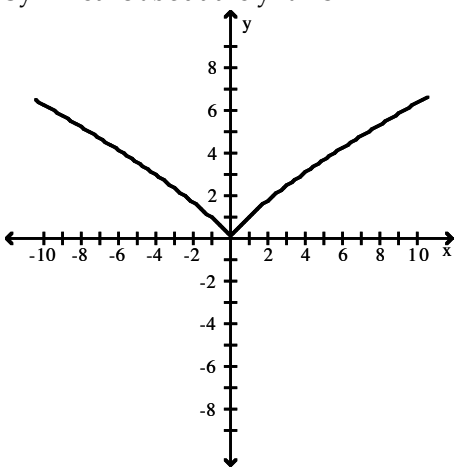
A) No symmetry



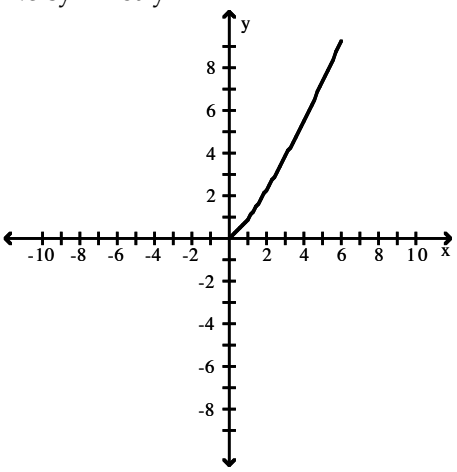
B) Symmetric about the y–axis



C) Symmetric about the y–axis



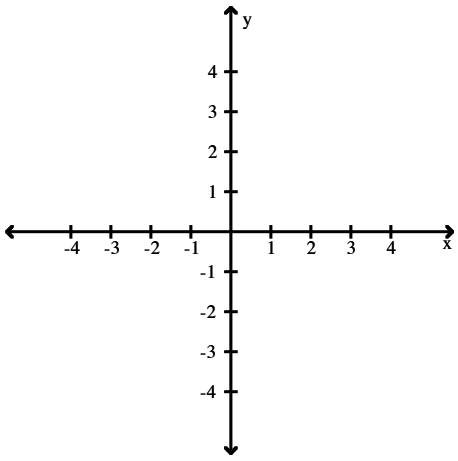
D) No symmetry



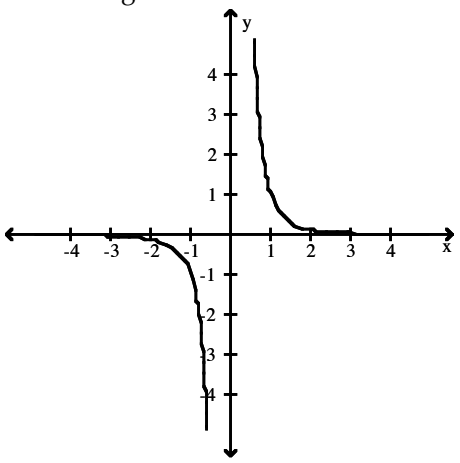
Answer: B

Graph the function. Specify the intervals over which the function is increasing and the intervals where it is decreasing.

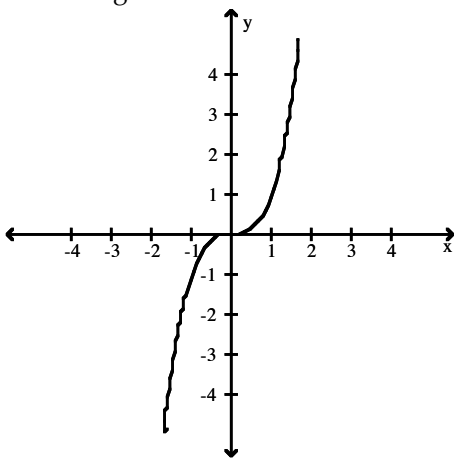
52) $y = \frac{1}{x^3}$



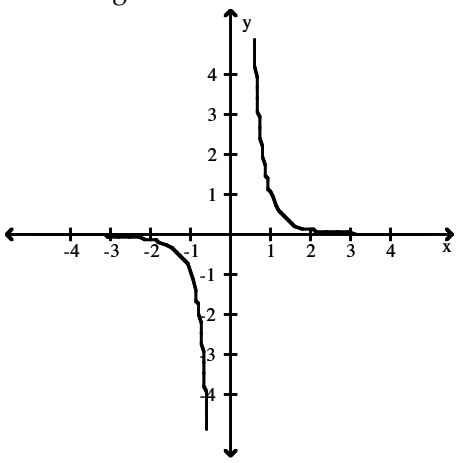
A) Decreasing $-\infty < x < 0$ and $0 < x < \infty$



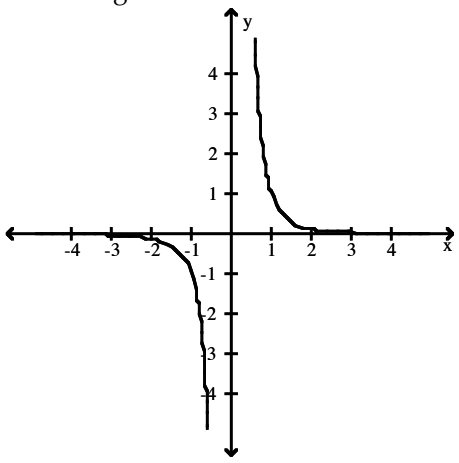
B) Increasing $-\infty < x < \infty$



C) Decreasing $-\infty < x < 0$;
Increasing $0 < x < \infty$

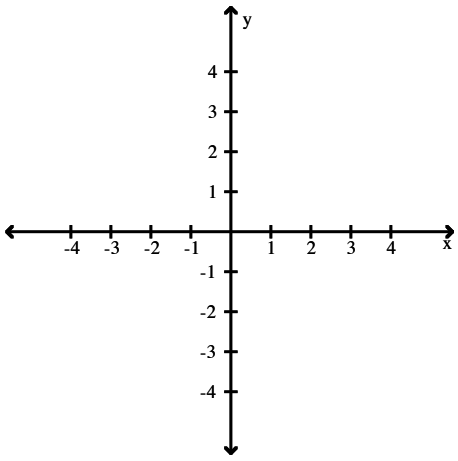


D) Increasing $-\infty < x < 0$ and $0 < x < \infty$

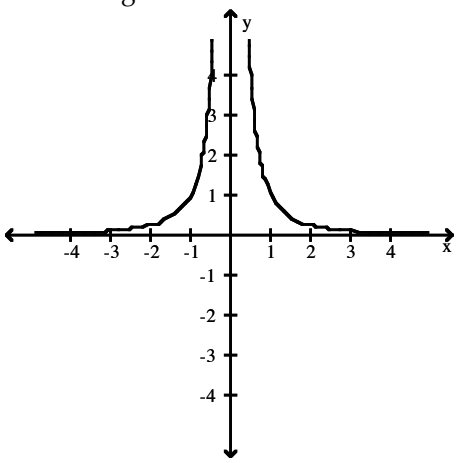


Answer: A

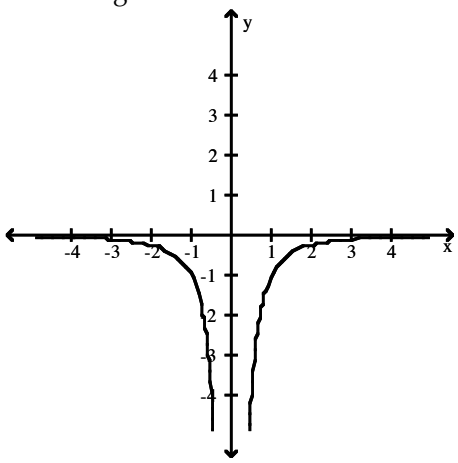
53) $y = -\frac{1}{x^2}$



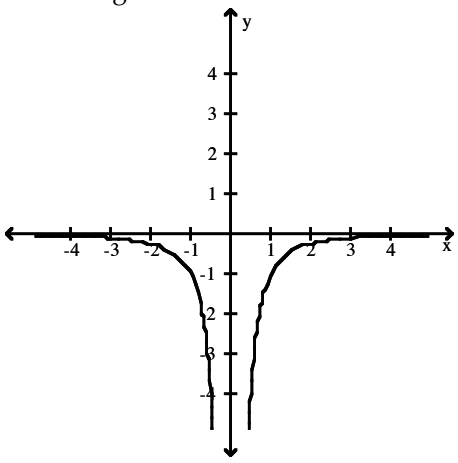
A) Increasing $-\infty < x < 0$
Decreasing $0 < x < \infty$



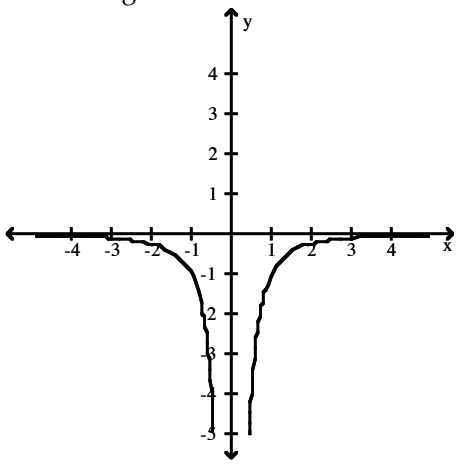
B) Decreasing $-\infty < x < 0$
Increasing $0 < x < \infty$



C) Increasing $-\infty < x < 0$ and $0 < x < \infty$

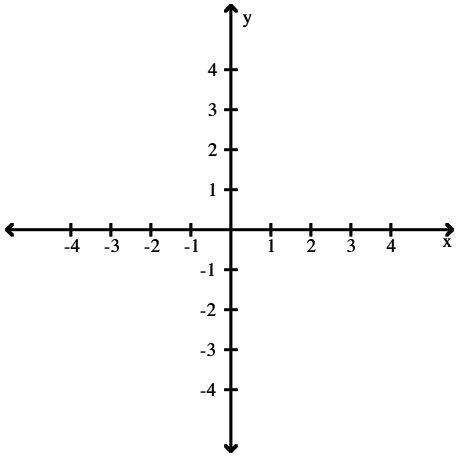


D) Decreasing $-\infty < x < 0$ and $0 < x < \infty$

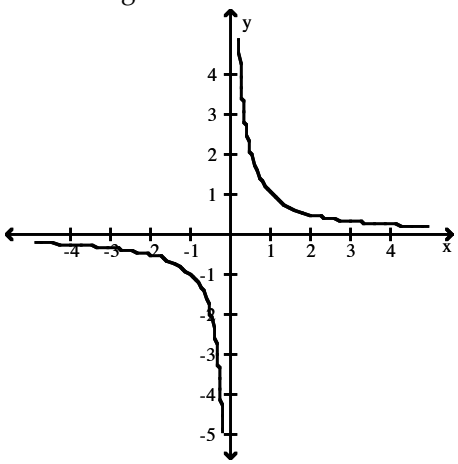


Answer: B

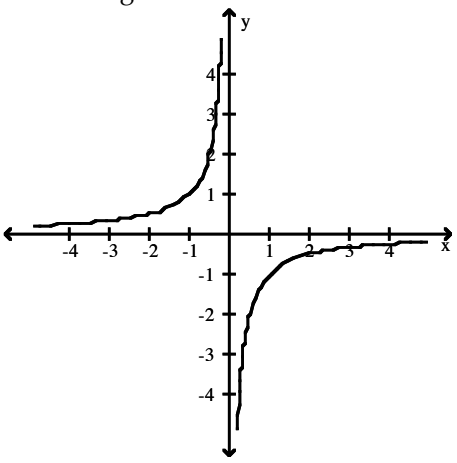
54) $y = \frac{1}{x}$



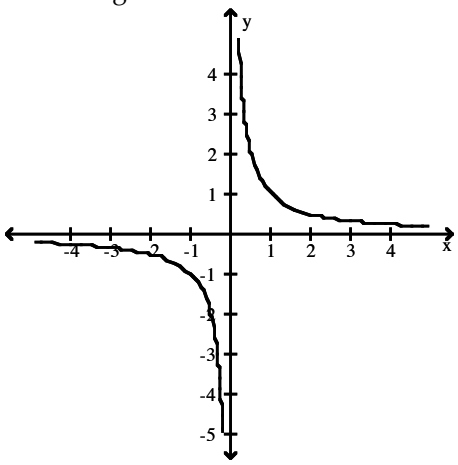
A) Decreasing $-\infty < x < 0$ and $0 < x < \infty$



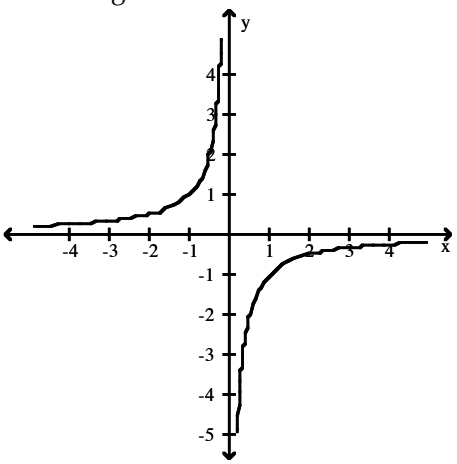
B) Increasing $-\infty < x < 0$
Decreasing $0 < x < \infty$



C) Decreasing $-\infty < x < 0$
Increasing $0 < x < \infty$

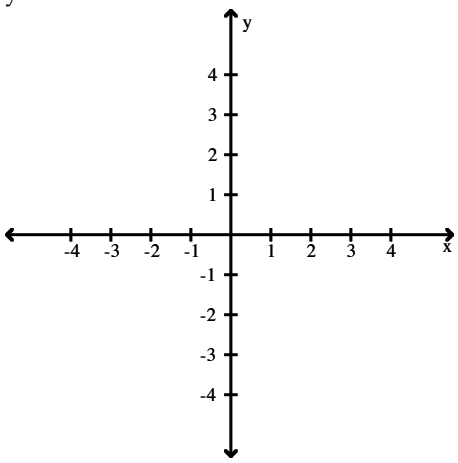


D) Increasing $-\infty < x < 0$ and $0 < x < \infty$

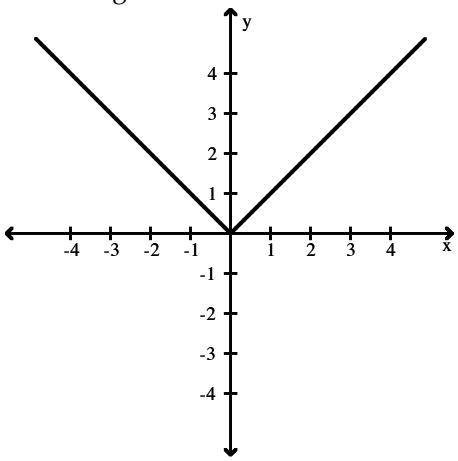


Answer: A

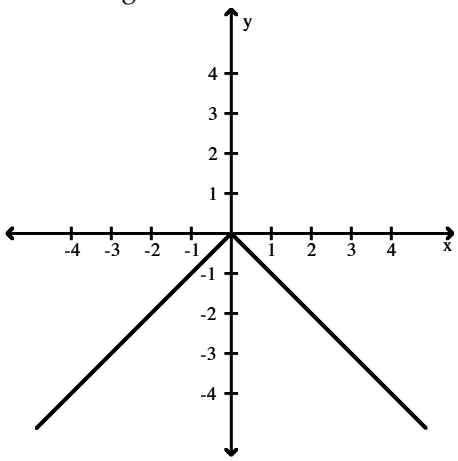
55) $y = -|x|$



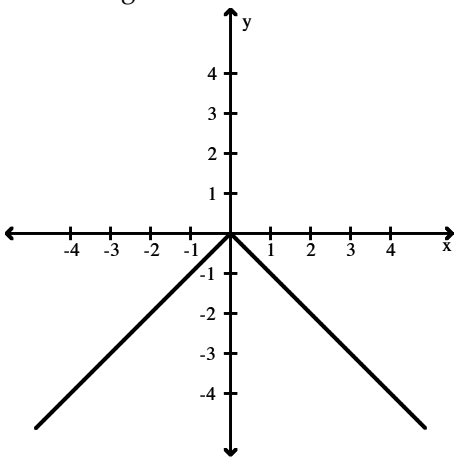
A) Increasing $-\infty < x < \infty$



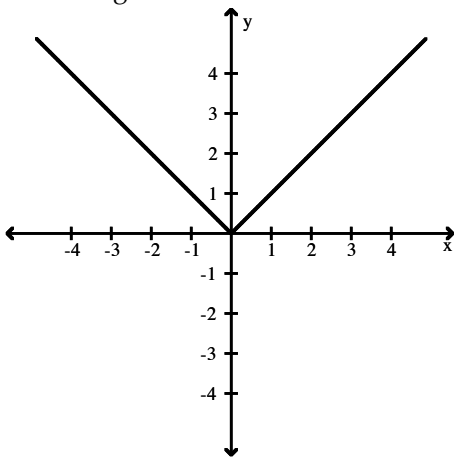
B) Decreasing $-\infty < x < \infty$



C) Increasing $-\infty < x \leq 0$
Decreasing $0 \leq x < \infty$

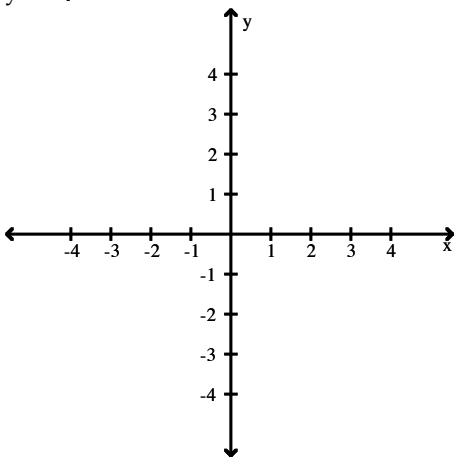


D) Decreasing $-\infty < x \leq 0$
Increasing $0 \leq x < \infty$

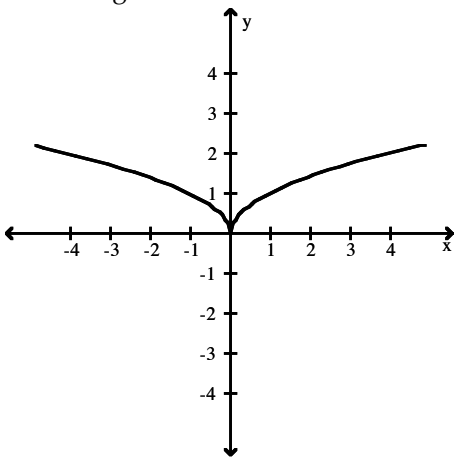


Answer: C

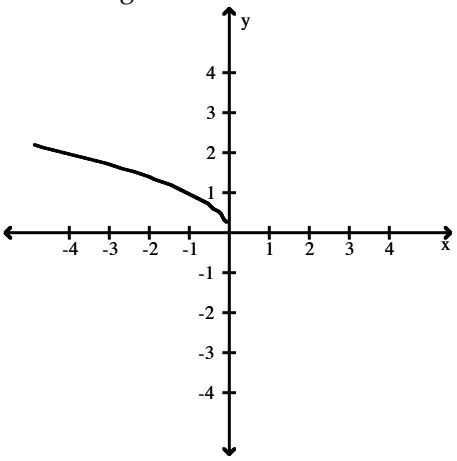
56) $y = \sqrt{-x}$



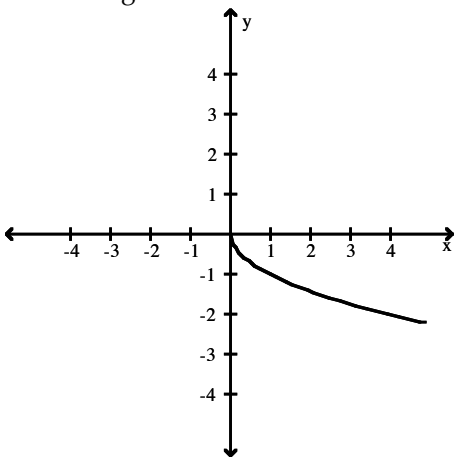
A) Decreasing $-\infty < x \leq 0$
Increasing $0 \leq x < \infty$



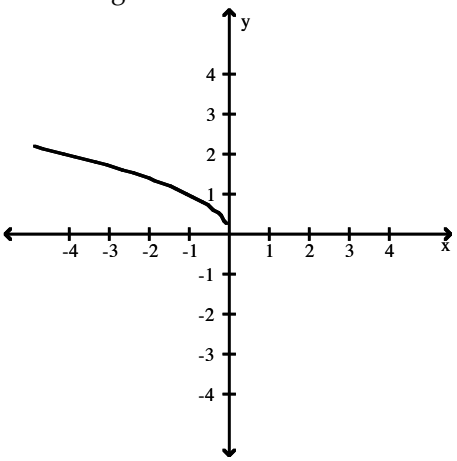
B) Decreasing $-\infty < x \leq 0$



C) Decreasing $0 \leq x < \infty$

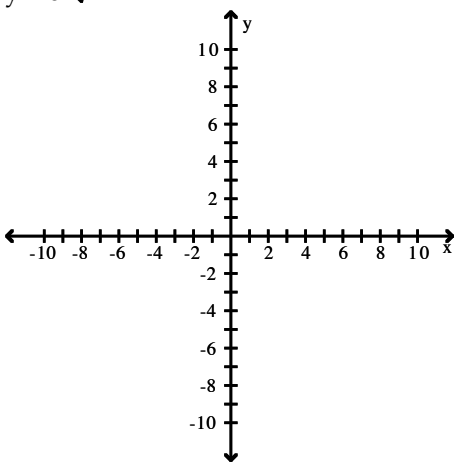


D) Increasing $-\infty < x \leq 0$

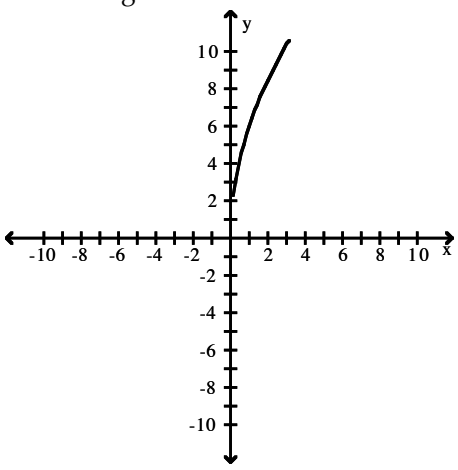


Answer: B

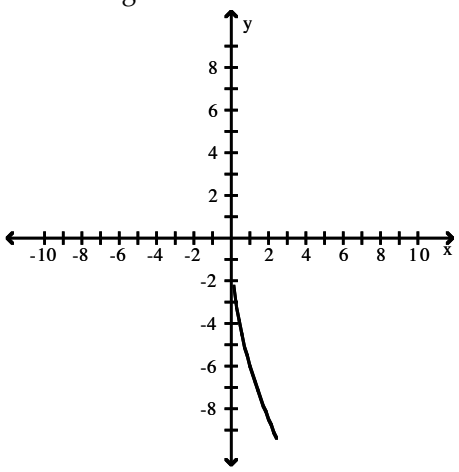
57) $y = 6\sqrt{x}$



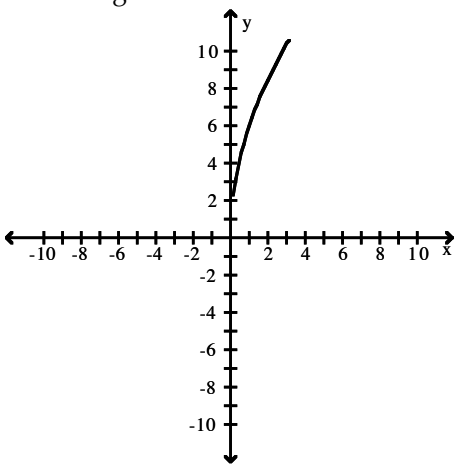
A) Decreasing $0 \le x < \infty$



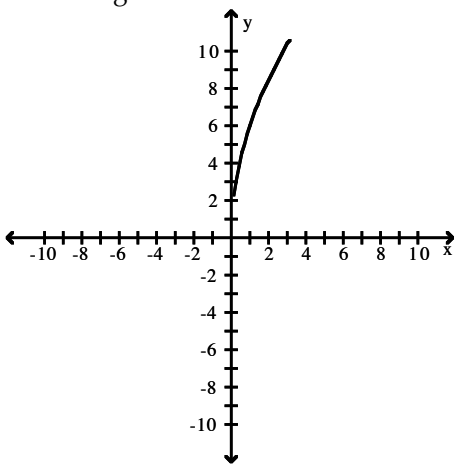
B) Decreasing $0 \le x < \infty$



C) Increasing $0 \le x < \infty$

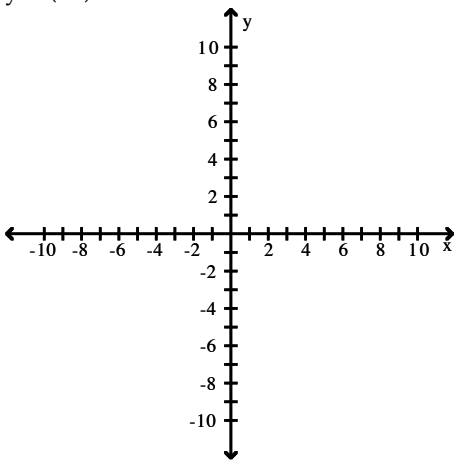


D) Increasing $-\infty < x < \infty$

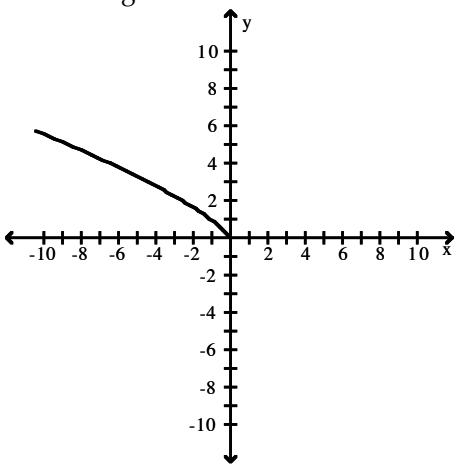


Answer: C

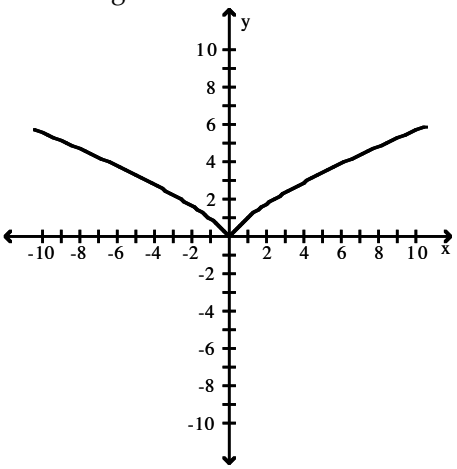
58) $y = (-x)^{3/4}$



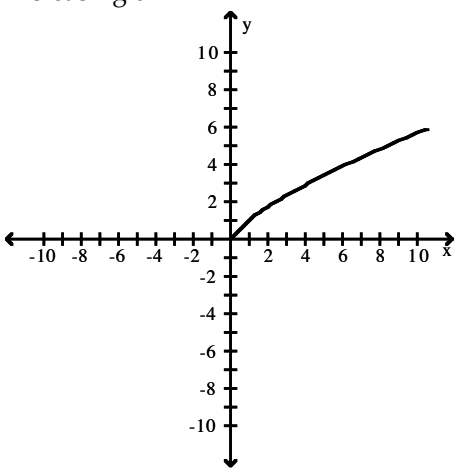
A) Decreasing $-\infty < x \leq 0$



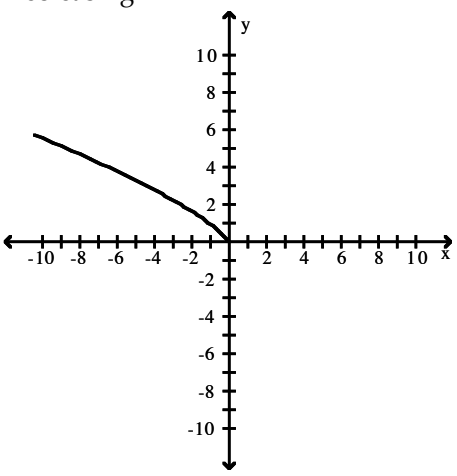
B) Decreasing $-\infty < x \leq 0$
Increasing $0 \leq x < \infty$



C) Increasing $0 \leq x < \infty$

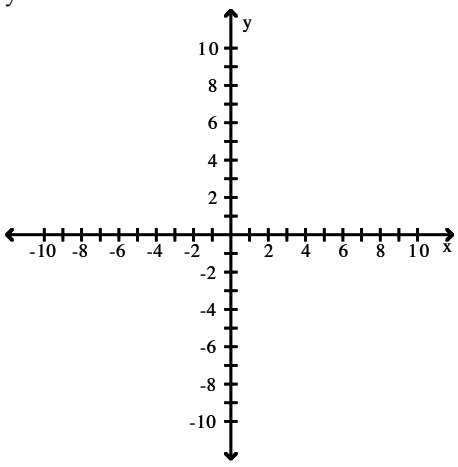


D) Decreasing $-\infty < x < \infty$

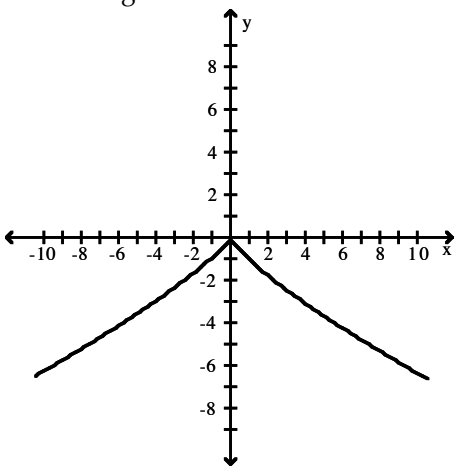


Answer: A

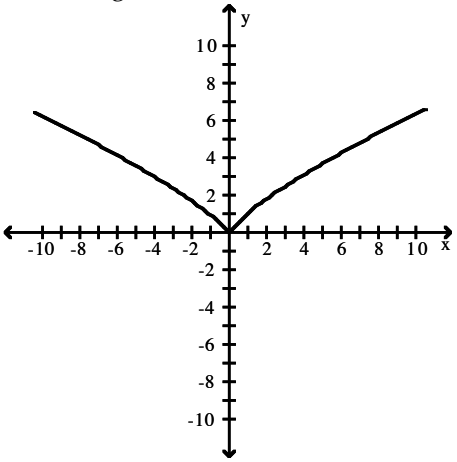
59) $y = -x^{4/5}$



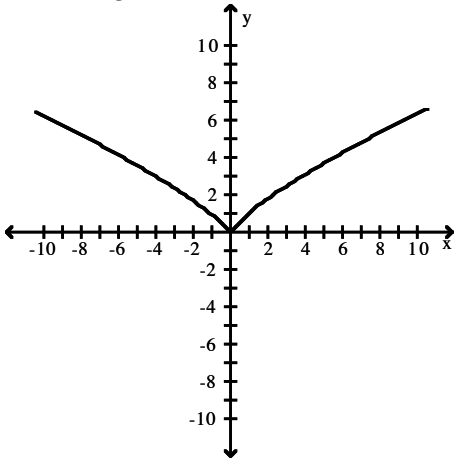
A) Increasing $-\infty < x < 0$
Decreasing $0 < x < \infty$



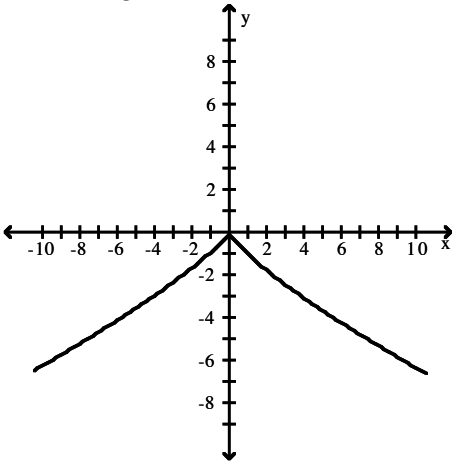
B) Decreasing $-\infty < x \le 0$
Increasing $0 \le x < \infty$



C) Increasing $-\infty < x < \infty$



D) Decreasing $-\infty < x < \infty$



Answer: A

Determine if the function is even, odd, or neither.

60) $f(x) = 6$

A) Even B) Odd C) Neither

Answer: A

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

A) Even B) Odd C) Neither

Answer: A

62) $f(x) = 3x^4 - 7x - 6$

A) Even B) Odd C) Neither

Answer: C

63) $f(x) = -7x^5 + 5x^3$

A) Even B) Odd C) Neither

Answer: B

64) $f(x) = (x + 6)(x - 9)$

A) Even B) Odd C) Neither

Answer: C

65) $f(x) = \dfrac{5}{x^2 - 3}$

A) Even B) Odd C) Neither

Answer: A

66) $f(x) = \dfrac{4}{x + 1}$

A) Even B) Odd C) Neither

Answer: C

67) $g(x) = \dfrac{8x}{x^2 + 8}$

A) Even B) Odd C) Neither

Answer: B

68) $g(x) = |6x^3|$

A) Even B) Odd C) Neither

Answer: A

69) $h(t) = \sqrt{t^2 - 3}$

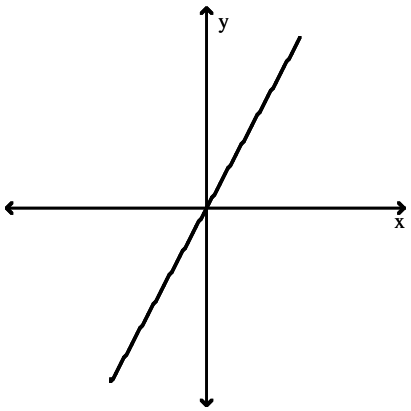
A) Even B) Odd C) Neither

Answer: A

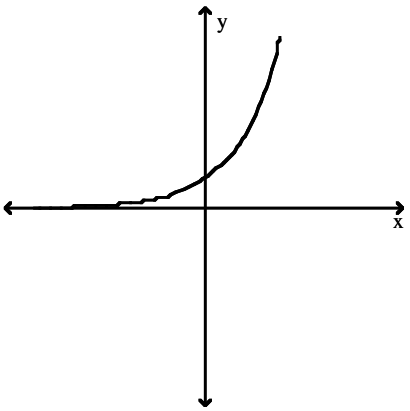
Match the equation with its graph.

70) $y = 2^x$

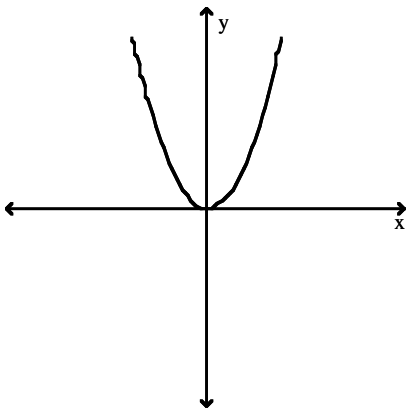
A)



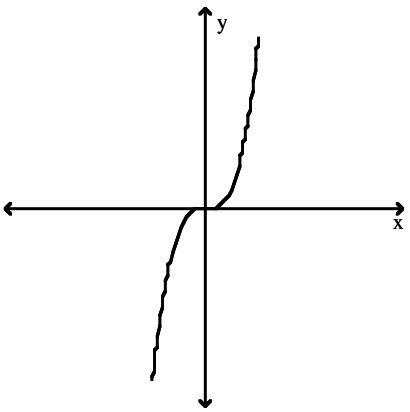
B)



C)



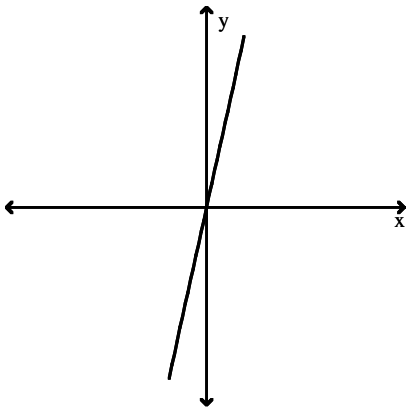
D)



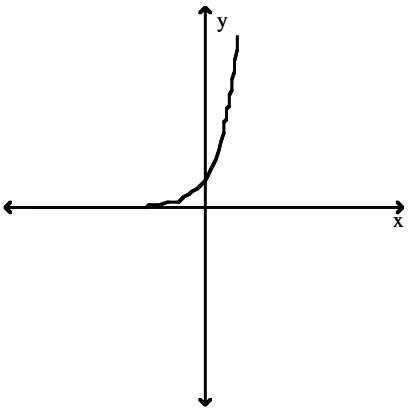
Answer: B

71) $y = x^5$

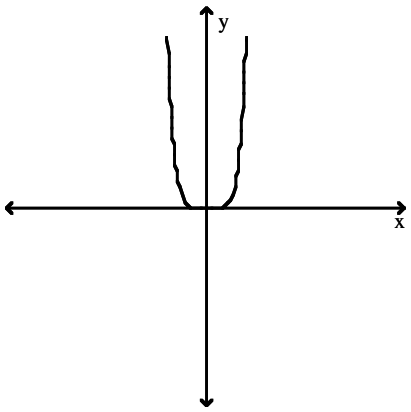
A)



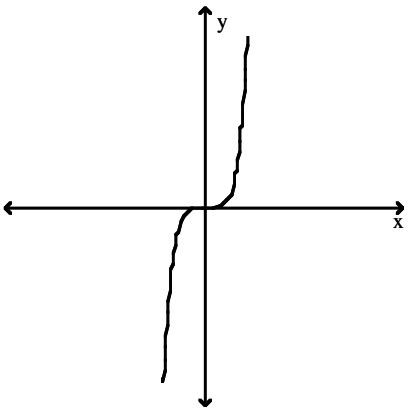
B)



C)



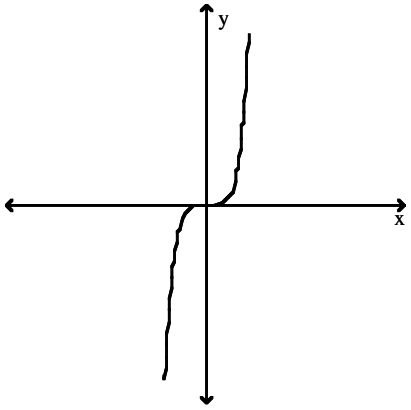
D)



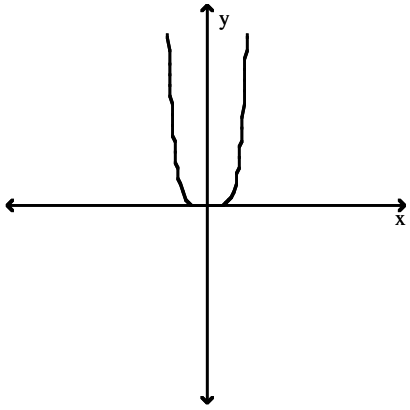
Answer: D

72) $y = 5x$

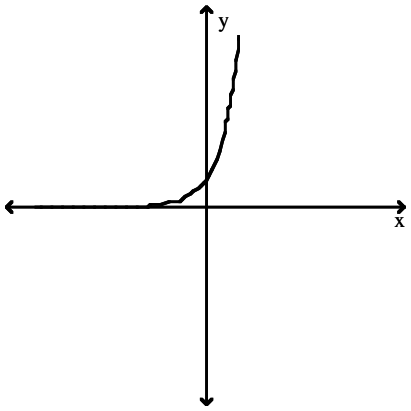
A)



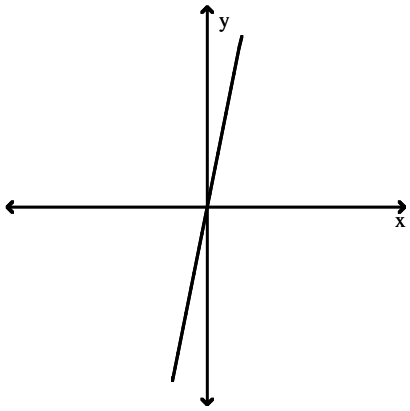
B)



C)



D)



Answer: D

Provide an appropriate response.

73) Graph the functions $f(x) = \frac{x}{3}$ and $g(x) = 3 + \frac{10}{3x}$ together to identify the values of x for which $\frac{x}{3} > 3 + \frac{10}{3x}$.

Confirm your findings algebraically.

A) $(-1, 0) \cup (10, \infty)$ B) $(-1, 10)$ C) $(10, \infty)$ D) $(-\infty, -1) \cup (0, 10)$

Answer: A

74) Graph the functions $f(x) = \frac{6}{x - 1}$ and $g(x) = \frac{4}{x + 1}$ together to identify the values of x for which $\frac{6}{x - 1} < \frac{4}{x + 1}$.

Confirm your findings algebraically.

A) $(-1, 1) \cup (1, \infty)$ B) $(-\infty, -5)$ C) $(-5, -1) \cup (1, \infty)$ D) $(-5, \infty)$

Answer: B

Solve the problem.

75) The variable s is proportional to t, and $s = 50$ when $t = 200$. Determine t when $s = 75$.

A) 4 B) 375 C) 290 D) 300

Answer: D

76) The kinetic energy K of a mass is proportional to the square of its velocity v. If $K = 8450$ joules when $v = 13$ m/sec, what is K when $v = 9$ m/sec?

A) 4860 B) 4050 C) 3240 D) 4455

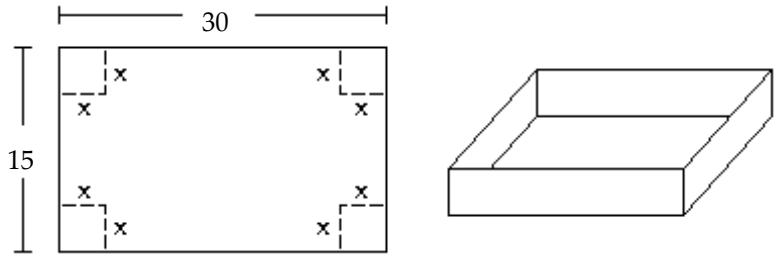
Answer: B

77) Boyle's Law says that volume V of a gas at constant temperature increases whenever the pressure P decreases, so that V and P are inversely proportional. If $P = 12.9$ lbs/in^2 when $V = 800$ in^3, then what is V when $P = 22$ lbs/in^2?

A) $\frac{4000}{1419}$ in^3 B) $\frac{176000}{129}$ in^3 C) $\frac{1419}{4000}$ in^3 D) $\frac{5160}{11}$ in^3

Answer: D

78) A box with an open top is to be constructed from a rectangular piece of cardboard with dimensions 15 inches by 30 inches by cutting out equal squares of side x at each corner and then folding up the sides as in the figure. Express the volume V of the box as a function of x.

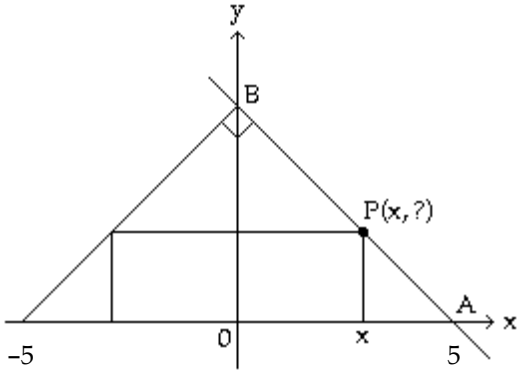


A) $V(x) = (15 - x)(30 - x)$ B) $V(x) = (15 - 2x)(30 - 2x)$

C) $V(x) = x(15 - x)(30 - x)$ D) $V(x) = x(15 - 2x)(30 - 2x)$

Answer: D

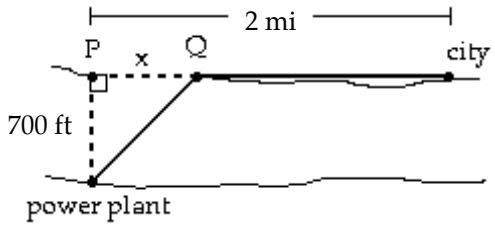
79) The figure shown here shows a rectangle inscribed in an isosceles right triangle whose hypotenuse is 10 units long. Express the area A of the rectangle in terms of x.



A) $A(x) = 2x^2$ B) $A(x) = x(5 - x)$ C) $A(x) = 2x(x - 5)$ D) $A(x) = 2x(5 - x)$

Answer: D

80) A power plant is located on a river that is 700 feet wide. To lay a new cable from the plant to a location in a city 2 miles downstream on the opposite side costs $175 per foot across the river and $100 per foot along the land. Suppose that the cable goes from the plant to a point Q on the opposite side that is x feet from the point P directly opposite the plant. Write a function C(x) that gives the cost of laying the cable in terms of the distance x.



A) $C(x) = 100\sqrt{x^2 + 700^2} + 175(10{,}560 - x)$
B) $C(x) = 175(700 - x) + 100(2 - x)$
C) $C(x) = 175\sqrt{x^2 + 700^2} + 100(10{,}560 - x)$
D) $C(x) = 175\sqrt{x^2 + 700^2} + 100(2 - x)$

Answer: C

Provide an appropriate response.

81) Consider the function $y = \sqrt{1 - \frac{1}{x}}$. Can x be negative?

A) Yes
B) No

Answer: A

82) Consider the function $y = \sqrt{1 - \frac{1}{x}}$. Can x be greater than 0, but less than 1?

A) Yes
B) No

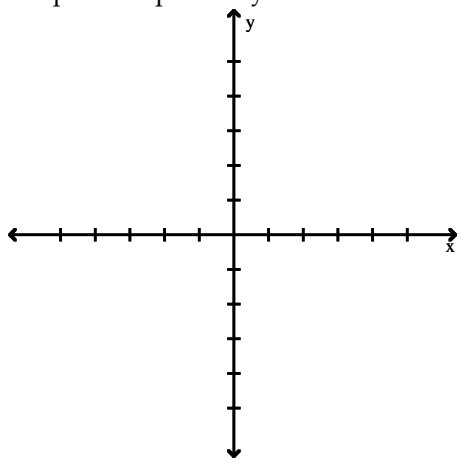
Answer: B

83) What is the domain of the function $y = \sqrt{1 - \frac{1}{x}}$?

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

Answer: D

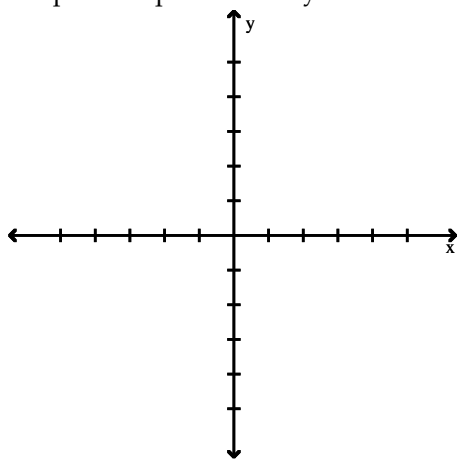
84) Graph the equation $y^2 = x$ and decide whether or not the graph represents a function of x.



A) Function B) Not a Function

Answer: B

85) Graph the equation $|x + y| = 1$ and decide whether or not the graph represents a function of x.



A) Function B) Not a Function

Answer: B

86) For what values of x is $\lfloor x \rfloor = 2$?

A) $1 < x \leq 2$ B) $2 < x \leq 3$ C) $1 \leq x < 2$ D) $2 \leq x < 3$

Answer: D

87) For what values of x is $\lceil x \rceil = -2$?

A) $-2 < x \leq -1$ B) $-2 \leq x < -1$ C) $-3 < x \leq -2$ D) $-3 \leq x < -2$

Answer: C

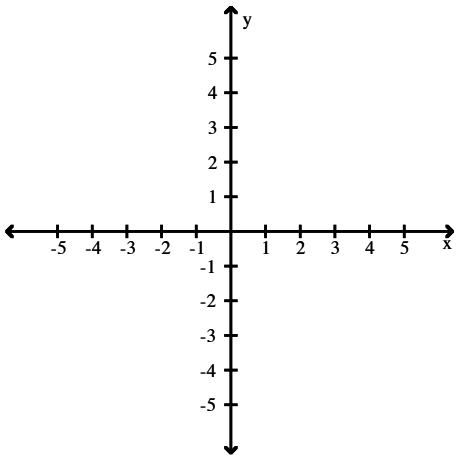
88) What real numbers x satisfy the equation $\lfloor x \rfloor = \lceil x \rceil$?

A) $\{x \mid x = 0\}$ B) $\{x \mid x \in$ real numbers$\}$

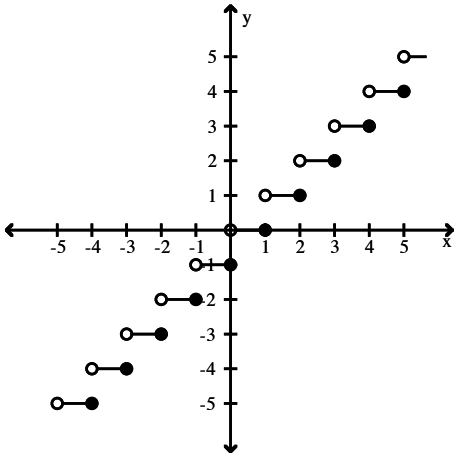
C) $\{x \mid x \in$ integers$\}$ D) $\emptyset$

Answer: C

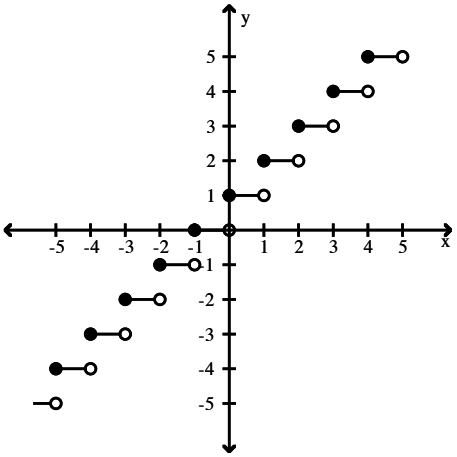
89) Graph the function f(x) = $\lfloor x \rfloor$.



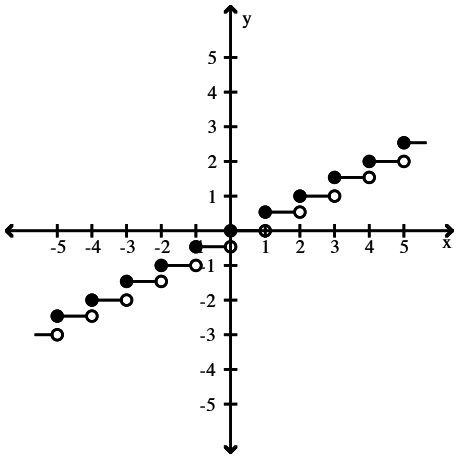
A)



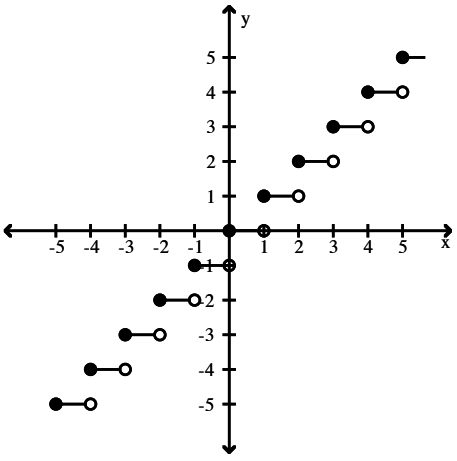
B)



C)

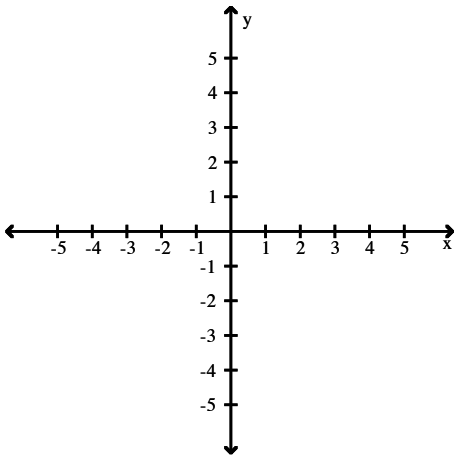


D)

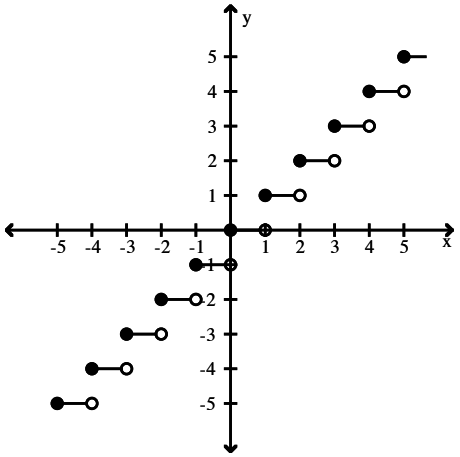


Answer: D

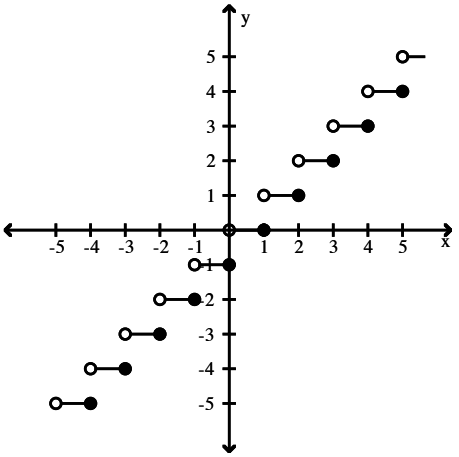
90) Graph the function $f(x) = \lceil x \rceil$.



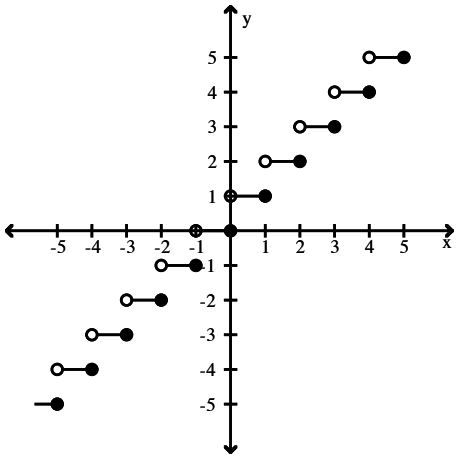
A)



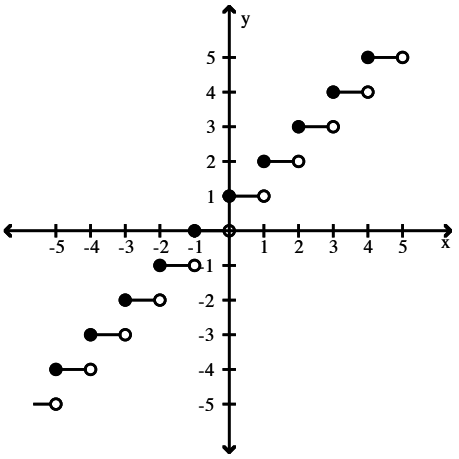
B)



C)



D)



Answer: C

Find the domain and range for the indicated function.

91) $f(x) = \sqrt{x+7}$, $g(x) = \sqrt{x-7}$; $f+g$

A) D: $x \geq 7$
R: $y \geq \sqrt{14}$

B) D: $x \geq -7$
R: $y \geq 0$

C) D: $x \geq 7$
R: $y \geq 0$

D) D: $x \geq -7$
R: $y \geq \sqrt{14}$

Answer: A

92) $f(x) = \sqrt{x+5}$, $g(x) = \sqrt{x-5}$; $g - f$

A) D: $x \geq 5$, R: $y \geq -\sqrt{10}$
B) D: $x \geq -5$, R: $y \geq -\sqrt{10}$
C) D: $x \geq 5$, R: $y \geq 0$
D) D: $x \geq 5$, R: $y \geq \sqrt{10}$

Answer: A

93) $f(x) = \sqrt{x+13}$, $g(x) = \sqrt{x-13}$; $f \cdot g$

A) D: $x > 13$, R: $y \geq 0$
B) D: $x \geq 13$, R: $y \geq 0$
C) D: $x \geq 13$, R: $y > 0$
D) D: $x \geq 13$, R: $-\infty < y < \infty$

Answer: B

94) $f(x) = 8$, $g(x) = 8 + \sqrt{x}$; f/g

A) D: $x \geq -8$, R: $y \geq 0$
B) D: $x \geq 0$, R: $y \leq 8$
C) D: $x \geq 0$, R: $y \geq 1$
D) D: $x \geq 0$, R: $y \leq 1$

Answer: D

95) $f(x) = 6$, $g(x) = 6 + \sqrt{x}$; g/f

A) D: $x \geq 0$, R: $y \leq 1$
B) D: $x \geq 0$, R: $y \geq 1$
C) D: $x \geq -6$, R: $y \geq 0$
D) D: $x \geq 0$, R: $y \leq 6$

Answer: B

Solve the problem.

96) If $f(x) = 7x + 13$ and $g(x) = 4x - 1$, find $f(g(x))$.

A) $28x + 12$
B) $28x + 6$
C) $28x + 51$
D) $28x + 20$

Answer: B

97) If $f(x) = -5x + 2$ and $g(x) = 6x + 8$, find $g(f(x))$.

A) $-30x - 4$
B) $-30x + 20$
C) $-30x + 42$
D) $30x + 20$

Answer: B

98) If $f(x) = \frac{x-9}{2}$ and $g(x) = 2x + 9$, find $g(f(x))$.

A) $-\frac{9}{2}$
B) $2x + 9$
C) x
D) $x + 18$

Answer: C

99) If $f(x) = \sqrt{x+7}$ and $g(x) = 8x - 11$, find $f(g(x))$.

A) $8\sqrt{x-4}$
B) $2\sqrt{2x-1}$
C) $8\sqrt{x+7} - 11$
D) $2\sqrt{2x+1}$

Answer: B

100) If $f(x) = 4x^2 + 6x + 5$ and $g(x) = 6x - 7$, find $g(f(x))$.

A) $4x^2 + 6x - 2$
B) $24x^2 + 36x + 37$
C) $24x^2 + 36x + 23$
D) $4x^2 + 36x + 23$

Answer: C

101) If $f(x) = \frac{1}{x}$ and $g(x) = 9x^4$, find g(f(x)).

A) $\frac{9}{x^4}$ B) $\frac{1}{x^4}$ C) $\frac{1}{9x^4}$ D) $\frac{9}{x}$

Answer: A

102) If $f(x) = -8x + 6$ and $g(x) = -7x^2 + 8x - 5$, find g(f(–3)).

A) 70 B) –6065 C) 742 D) 25

Answer: B

103) If $f(x) = -2x - 3$ and $g(x) = -4x^2 - 2x + 7$, find g(f(6)).

A) 97 B) –863 C) 55 D) 295

Answer: B

104) If $f(x) = \sqrt{x}$, $g(x) = \frac{x}{3}$, and $h(x) = 3x + 12$, find f(g(h(x))).

A) $3\sqrt{x} + 12$ B) $\sqrt{x + 4}$ C) $\sqrt{x + 12}$ D) $\sqrt{x} + 4$

Answer: B

105) If $f(x) = \sqrt{x}$, $g(x) = \frac{x}{2}$, and $h(x) = 2x + 8$, find h(g(f(x))).

A) $2\sqrt{x} + 8$ B) $\sqrt{x + 4}$ C) $\sqrt{x} + 4$ D) $\sqrt{x} + 8$

Answer: D

Express the given function as a composite of functions f and g such that y = f(g(x)).

106) $y = \frac{1}{x^2 - 4}$

A) $f(x) = \frac{1}{x^2}$, $g(x) = x - 4$ B) $f(x) = \frac{1}{x^2}$, $g(x) = -\frac{1}{4}$

C) $f(x) = \frac{1}{x}$, $g(x) = x^2 - 4$ D) $f(x) = \frac{1}{4}$, $g(x) = x^2 - 4$

Answer: C

107) $y = |6x + 10|$

A) $f(x) = -|x|$, $g(x) = 6x + 10$ B) $f(x) = x$, $g(x) = 6x + 10$

C) $f(x) = |x|$, $g(x) = 6x + 10$ D) $f(x) = |-x|$, $g(x) = 6x - 10$

Answer: C

108) $y = \frac{10}{x^2} + 10$

A) $f(x) = \frac{1}{x}$, $g(x) = \frac{10}{x} + 10$

B) $f(x) = x$, $g(x) = \frac{10}{x} + 10$

C) $f(x) = \frac{10}{x^2}$, $g(x) = 10$

D) $f(x) = x + 10$, $g(x) = \frac{10}{x^2}$

Answer: D

109) $y = \frac{5}{\sqrt{5x + 8}}$

A) $f(x) = \sqrt{5x + 8}$, $g(x) = 5$

B) $f(x) = \frac{5}{\sqrt{x}}$, $g(x) = 5x + 8$

C) $f(x) = 5$, $g(x) = \sqrt{5 + 8}$

D) $f(x) = \frac{5}{x}$, $g(x) = 5x + 8$

Answer: B

110) $y = (-9x + 3)^7$

A) $f(x) = x^7$, $g(x) = -9x + 3$

B) $f(x) = -9x^7$, $g(x) = x + 3$

C) $f(x) = (-9x)^7$, $g(x) = 3$

D) $f(x) = -9x + 3$, $g(x) = x^7$

Answer: A

Solve the problem.

111) Let $f(x) = \frac{x}{x - 9}$. Find a function $y = g(x)$ so that $(f \circ g)(x) = x$.

A) $g(x) = x(x - 9)$

B) $g(x) = \frac{x - 9}{9}$

C) $g(x) = \frac{9x}{x - 1}$

D) $g(x) = \frac{1}{x - 9}$

Answer: C

112) Let $f(x) = \sqrt{x - 1}$. Find a function $y = g(x)$ so that $(f \circ g)(x) = \sqrt{x^2 - 1}$.

A) $g(x) = x^2 + 1$

B) $g(x) = x^2 - 1$

C) $g(x) = 2x$

D) $g(x) = x^2$

Answer: D

113) Let $g(x) = \sqrt{x}$. Find a function $y = f(x)$ so that $(f \circ g)(x) = |x|$.

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

B) $f(x) = x$

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

D) $f(x) = \frac{1}{x}$

Answer: C

114) Let $g(x) = x + 8$. Find a function $y = f(x)$ so that $(f \circ g)(x) = 4x + 32$

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

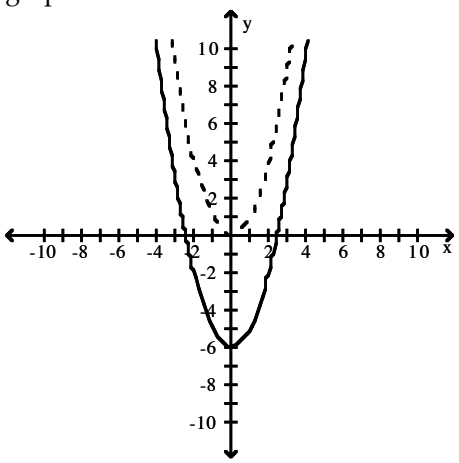
B) $f(x) = 4x - 8$

C) $f(x) = 4x + 8$

D) $f(x) = 4x$

Answer: D

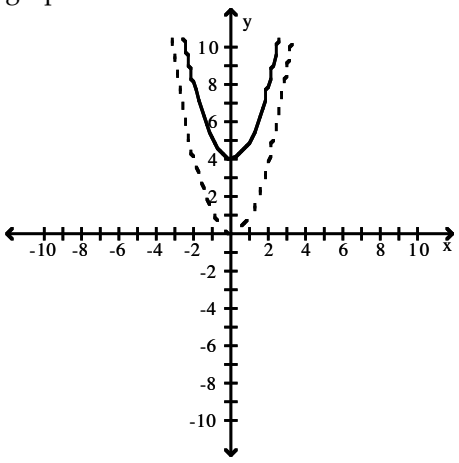
115) The accompanying figure shows the graph of $y = x^2$ shifted to a new position. Write the equation for the new graph.



A) $y = x^2 + 6$ B) $y = (x + 6)^2$ C) $y = (x - 6)^2$ D) $y = x^2 - 6$

Answer: D

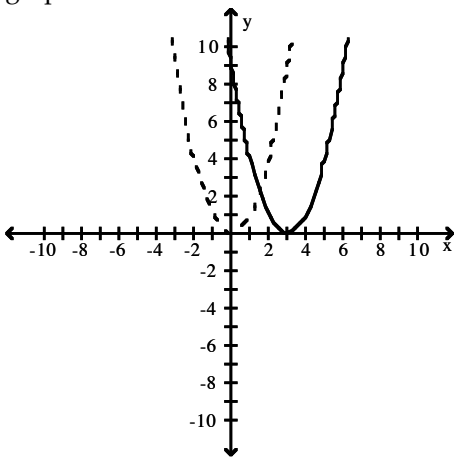
116) The accompanying figure shows the graph of $y = x^2$ shifted to a new position. Write the equation for the new graph.



A) $y = x^2 + 4$ B) $y = x^2 - 4$ C) $y = (x + 4)^2$ D) $y = (x - 4)^2$

Answer: A

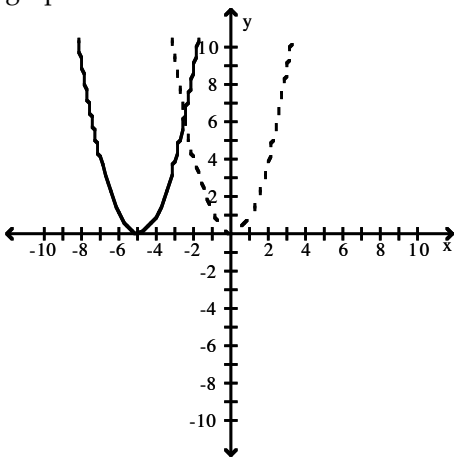
117) The accompanying figure shows the graph of $y = x^2$ shifted to a new position. Write the equation for the new graph.



A) $y = x^2 + 3$ B) $y = (x - 3)^2$ C) $y = (x + 3)^2$ D) $y = x^2 - 3$

Answer: B

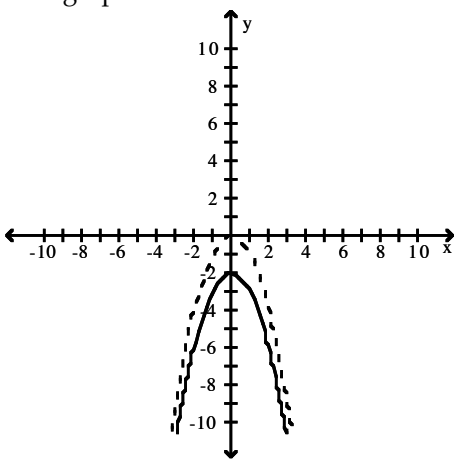
118) The accompanying figure shows the graph of $y = x^2$ shifted to a new position. Write the equation for the new graph.



A) $y = (x + 5)^2$ B) $y = x^2 + 5$ C) $y = (x - 5)^2$ D) $y = x^2 - 5$

Answer: A

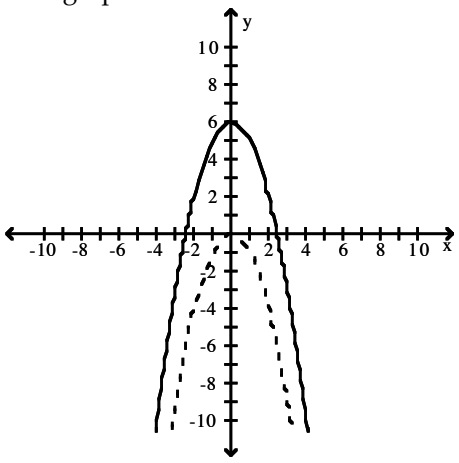
119) The accompanying figure shows the graph of $y = -x^2$ shifted to a new position. Write the equation for the new graph.



A) $y = -(x - 2)^2$ B) $y = -x^2 + 2$ C) $y = -x^2 - 2$ D) $y = -(x + 2)^2$

Answer: C

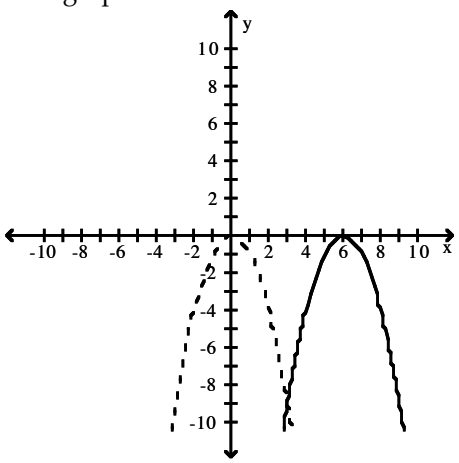
120) The accompanying figure shows the graph of $y = -x^2$ shifted to a new position. Write the equation for the new graph.



A) $y = -x^2 + 6$ B) $y = -(x - 6)^2$ C) $y = -x^2 - 6$ D) $y = -(x + 6)^2$

Answer: A

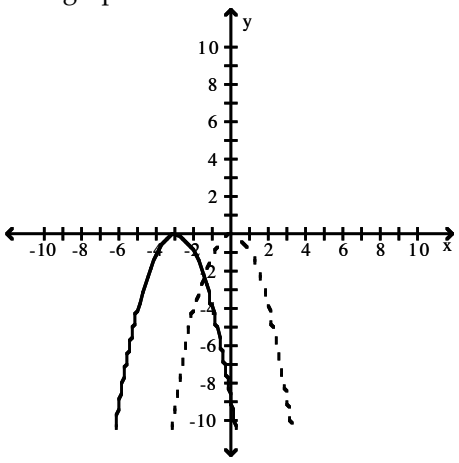
121) The accompanying figure shows the graph of $y = -x^2$ shifted to a new position. Write the equation for the new graph.



A) $y = -(x + 6)^2$ B) $y = -(x - 6)^2$ C) $y = -x^2 - 6$ D) $y = -x^2 + 6$

Answer: B

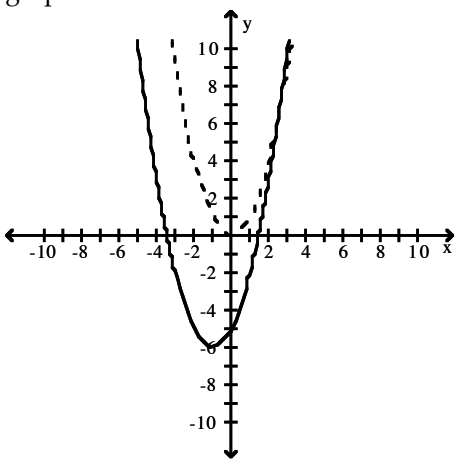
122) The accompanying figure shows the graph of $y = -x^2$ shifted to a new position. Write the equation for the new graph.



A) $y = -(x + 3)^2$ B) $y = -x^2 + 3$ C) $y = -x^2 - 3$ D) $y = -(x - 3)^2$

Answer: A

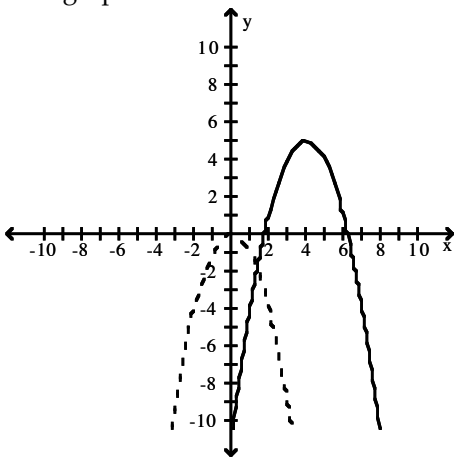
123) The accompanying figure shows the graph of $y = x^2$ shifted to a new position. Write the equation for the new graph.



A) $y = (x + 1)^2 + 6$ B) $y = (x + 6)^2 + 1$ C) $y = (x + 1)^2 - 6$ D) $y = (x - 1)^2 - 6$

Answer: C

124) The accompanying figure shows the graph of $y = -x^2$ shifted to a new position. Write the equation for the new graph.

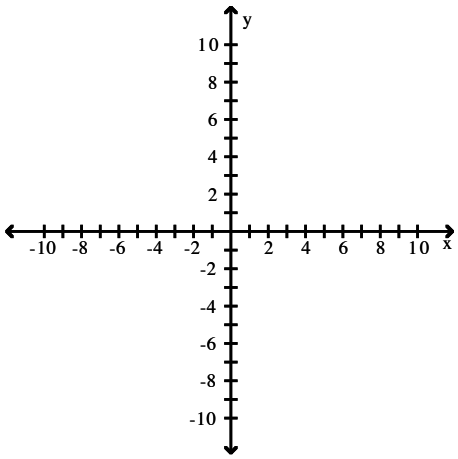


A) $y = -(x + 4)^2 + 5$ B) $y = -(x - 4)^2 + 5$ C) $y = -(x - 4)^2 - 5$ D) $y = -(x + 5)^2 + 4$

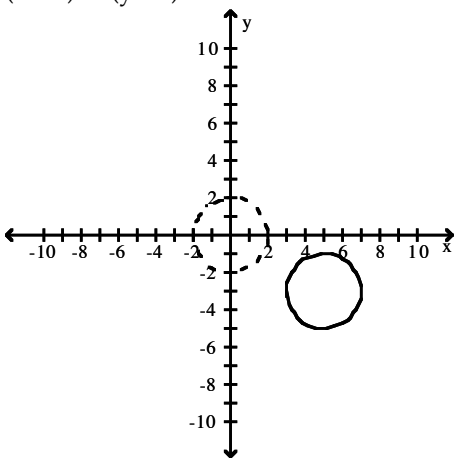
Answer: B

The problem tells how many units and in what direction the graph of the given equation is to be shifted. Give an equation for the shifted graph. Then sketch the original graph with a dashed line and the shifted graph with a solid line.

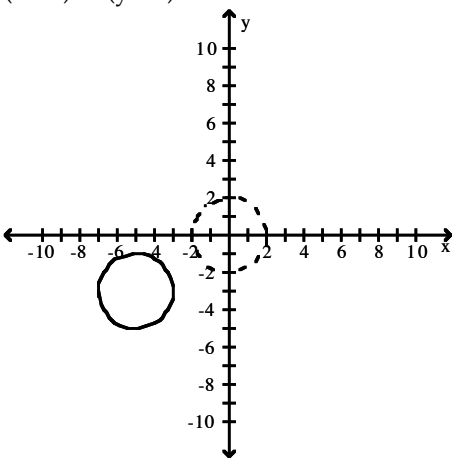
125) $x^2 + y^2 = 4$ Up 3, right 5



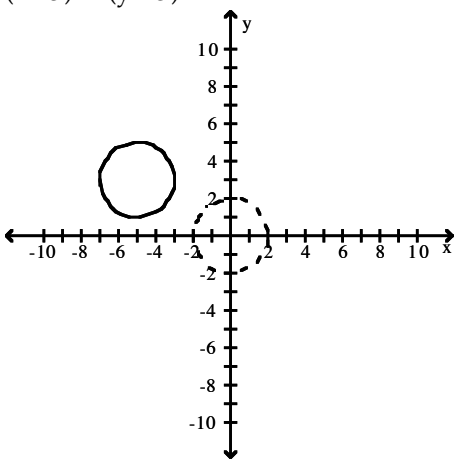
A) $(x - 5)^2 + (y + 3)^2 = 4$



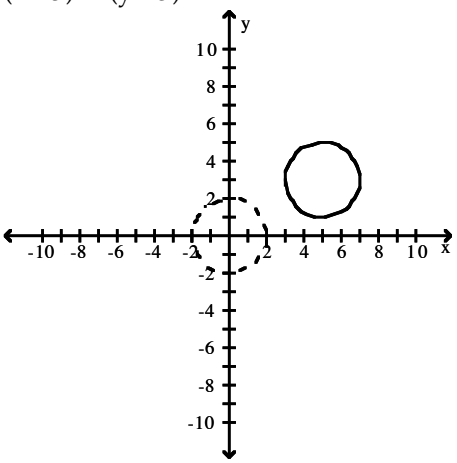
B) $(x + 5)^2 + (y + 3)^2 = 4$



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

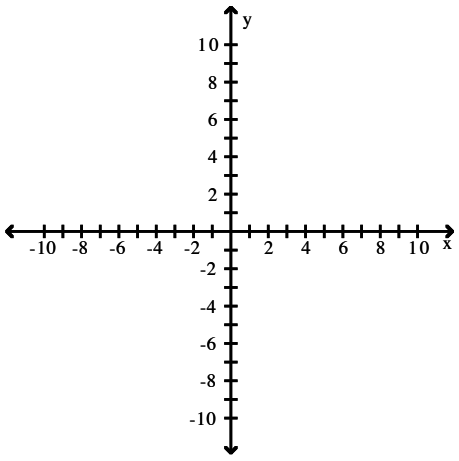


D) $(x - 5)^2 + (y - 3)^2 = 4$

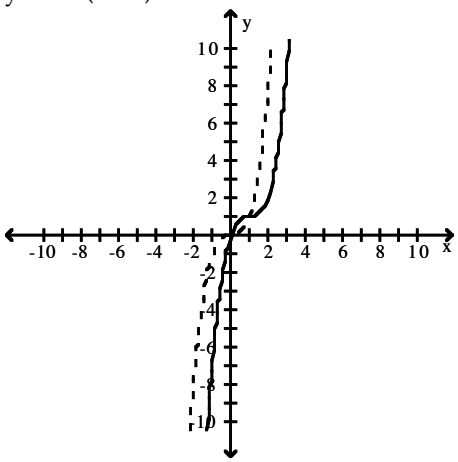


Answer: D

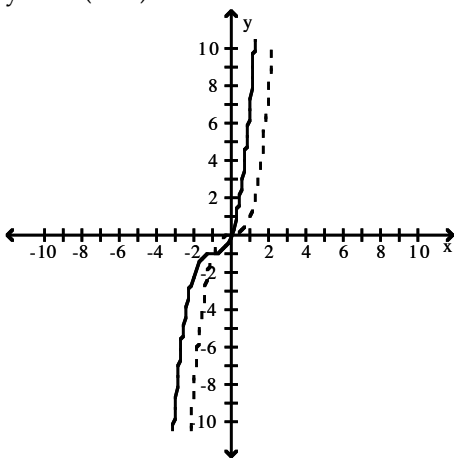
126) $y = x^3$ Down 1, left 1



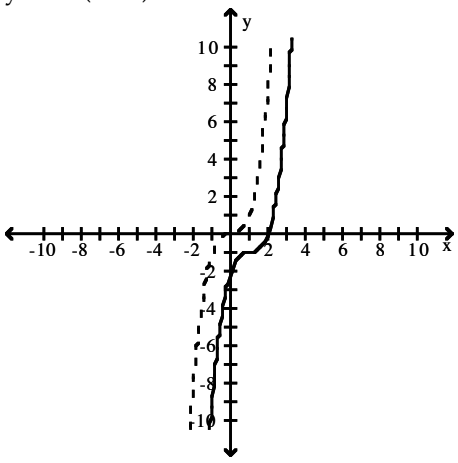
A) $y - 1 = (x - 1)^3$



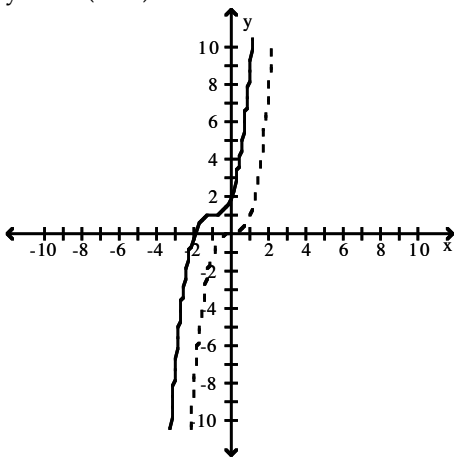
B) $y + 1 = (x + 1)^3$



C) $y + 1 = (x - 1)^3$

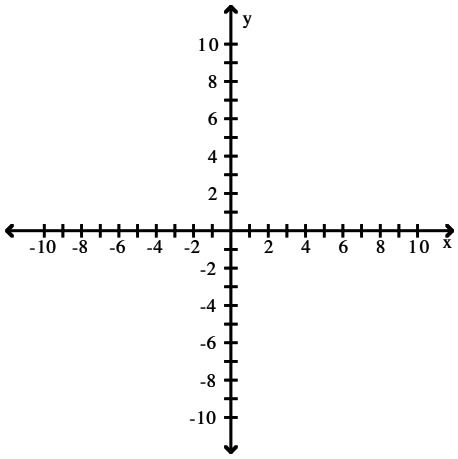


D) $y - 1 = (x + 1)^3$

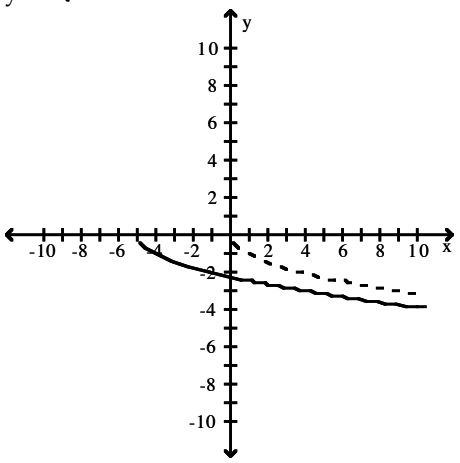


Answer: B

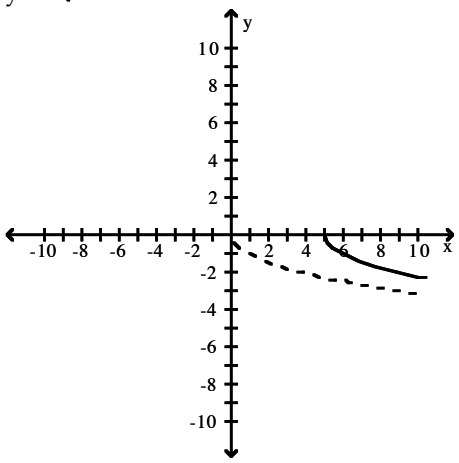
127) $y = -\sqrt{x}$ Left 5



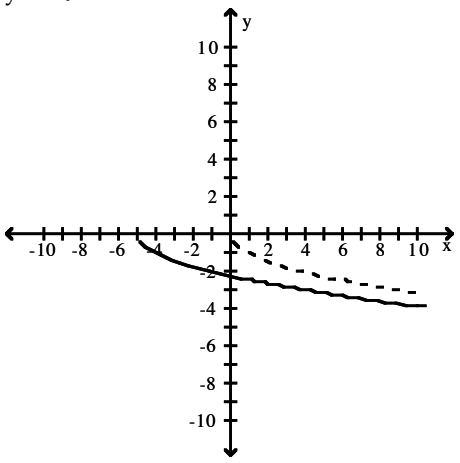
A) $y = \sqrt{x} + 5$



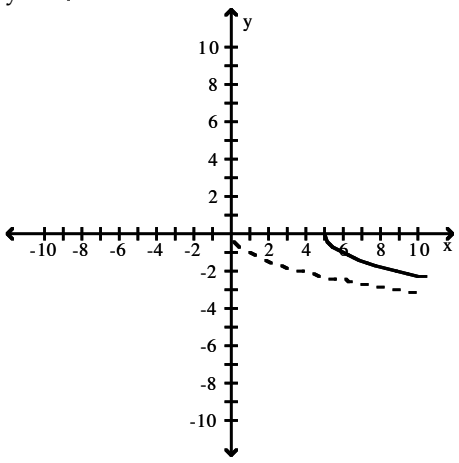
B) $y = \sqrt{x - 5}$



C) $y = \sqrt{x + 5}$

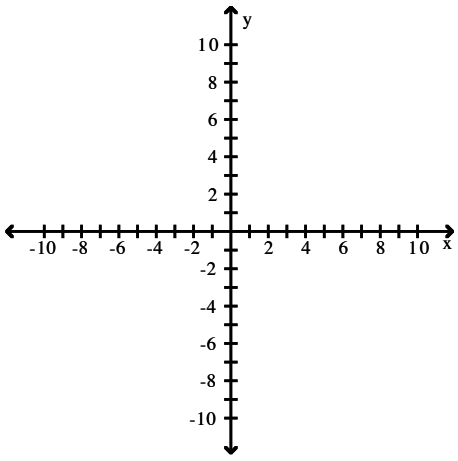


D) $y = \sqrt{x} - 5$

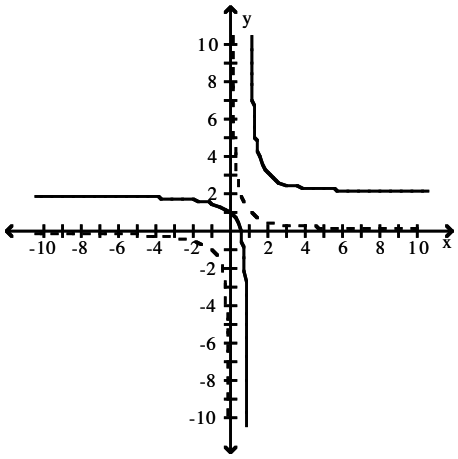


Answer: C

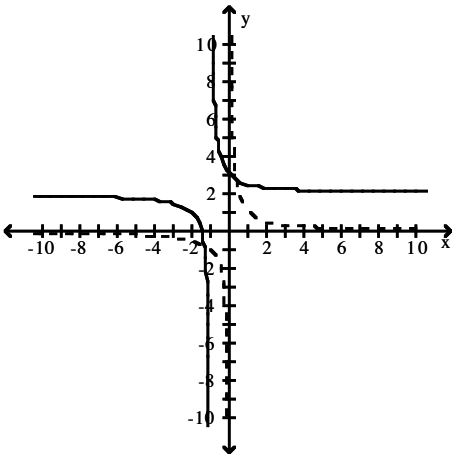
128) $y = \frac{1}{x}$ Down 2, right 1



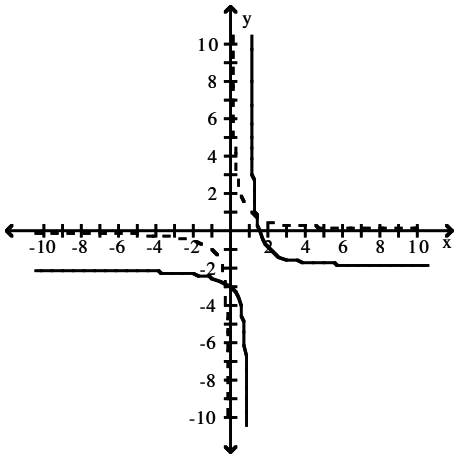
A) $y - 2 = \frac{1}{x - 1}$



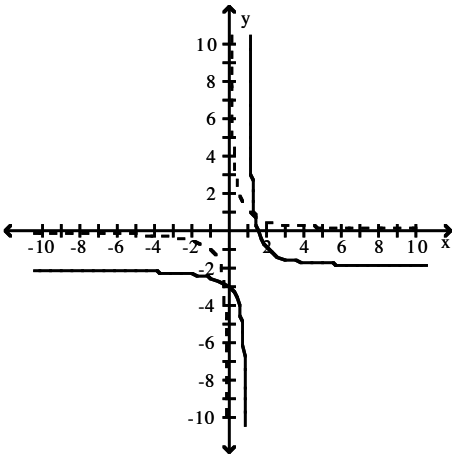
B) $y - 2 = \frac{1}{x + 1}$



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



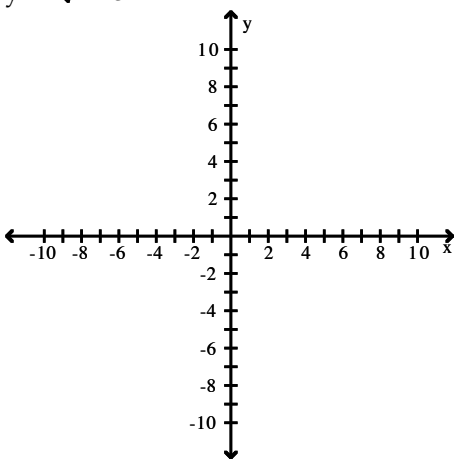
D) $y + 2 = \frac{1}{x + 1}$



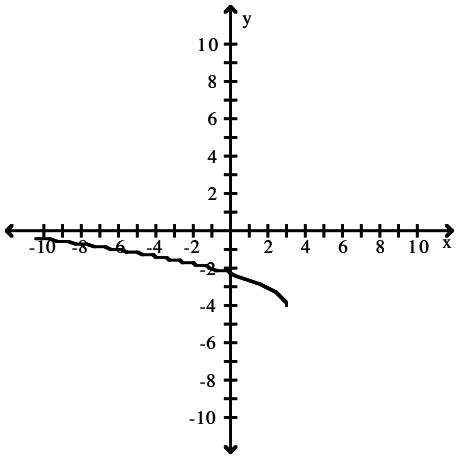
Answer: C

Graph the function.

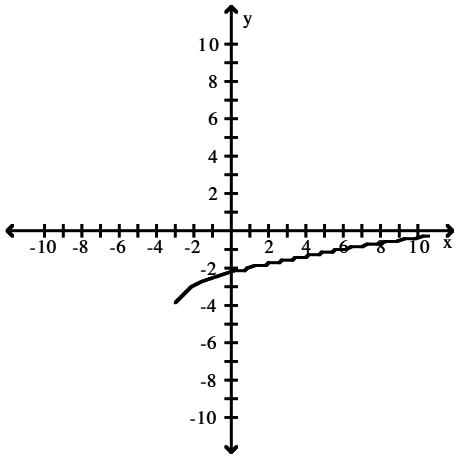
129) $y = \sqrt{x + 3} - 4$



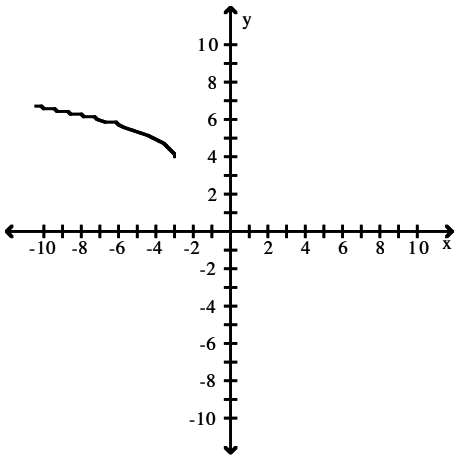
A)



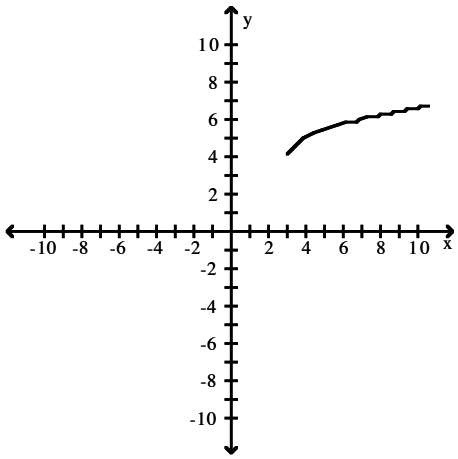
B)



C)

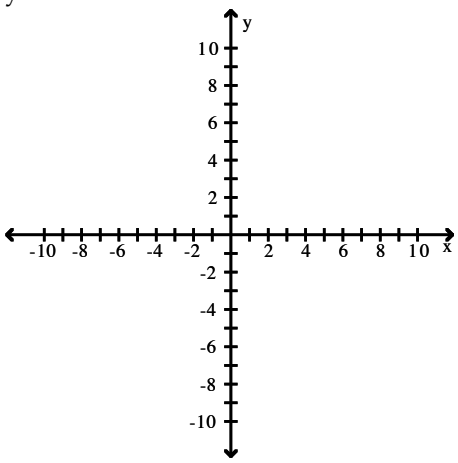


D)

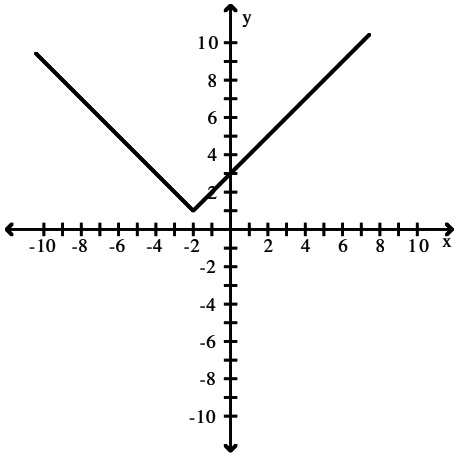


Answer: B

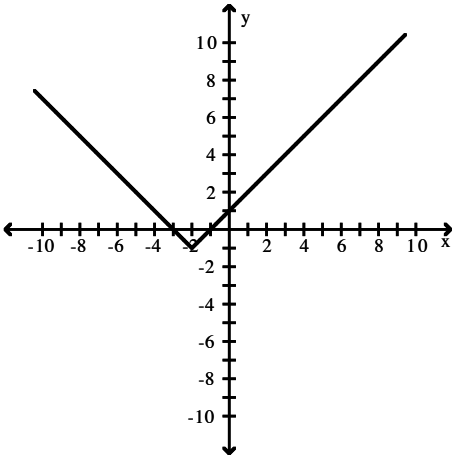
130) $y = |x - 2| - 1$



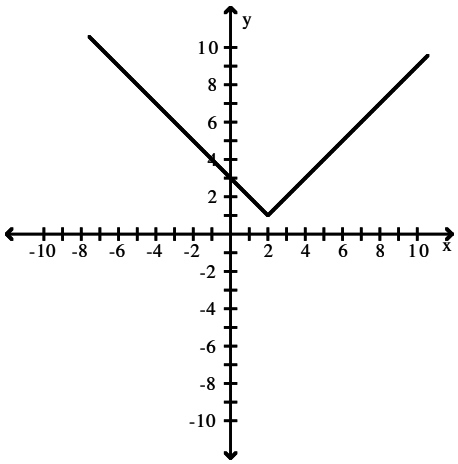
A)



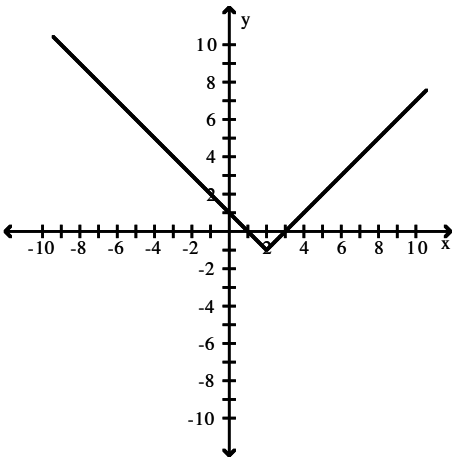
B)



C)

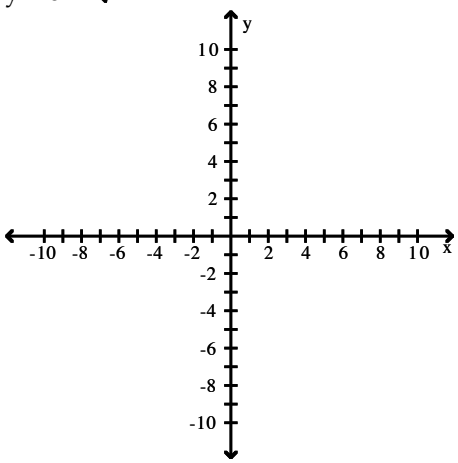


D)

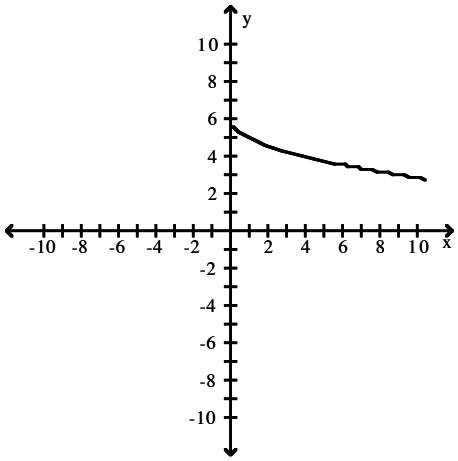


Answer: D

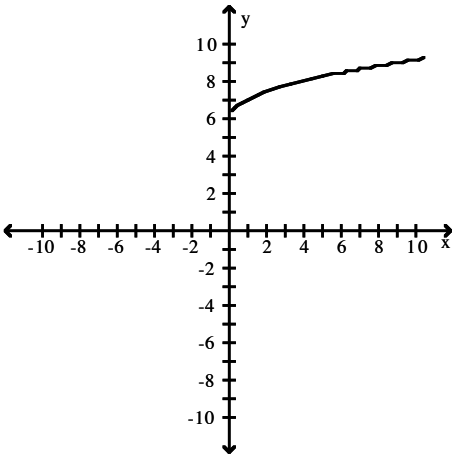
131) $y = 6 - \sqrt{x}$



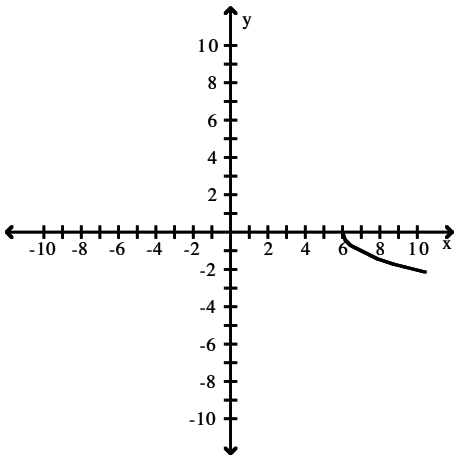
A)



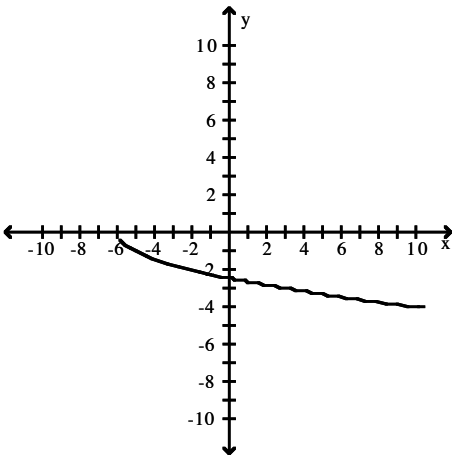
B)



C)

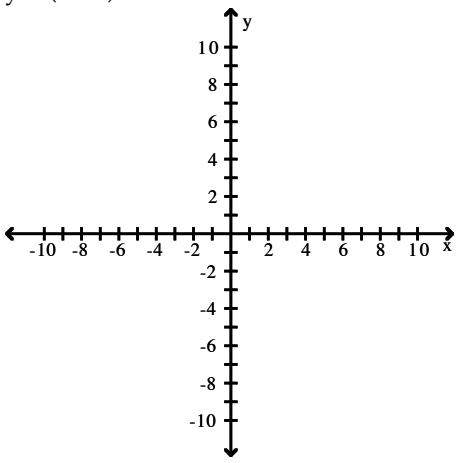


D)

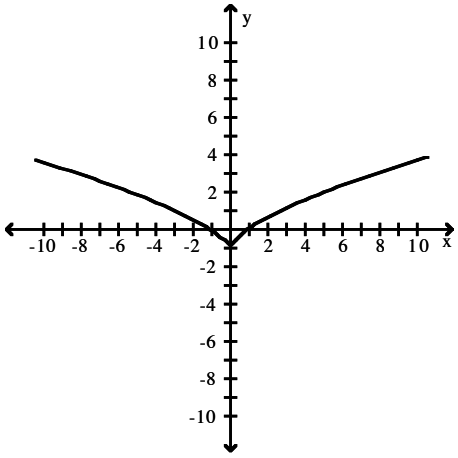


Answer: A

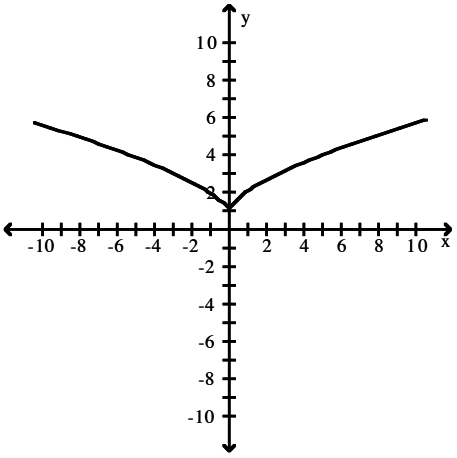
132) $y = (x+1)^{2/3}$



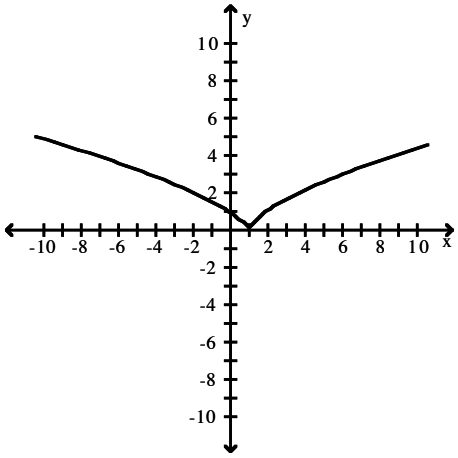
A)



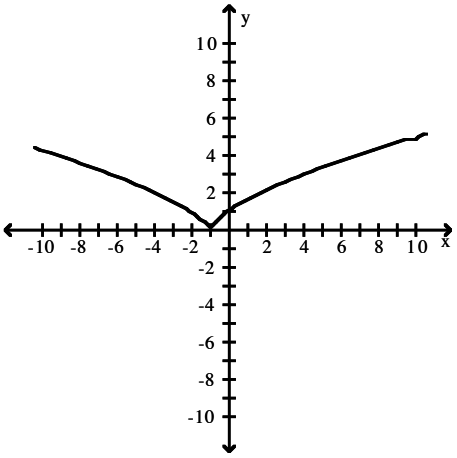
B)



C)

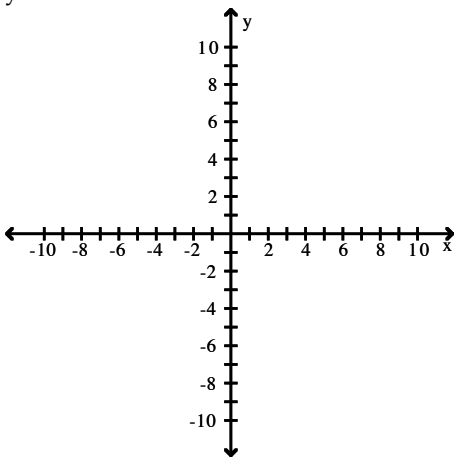


D)

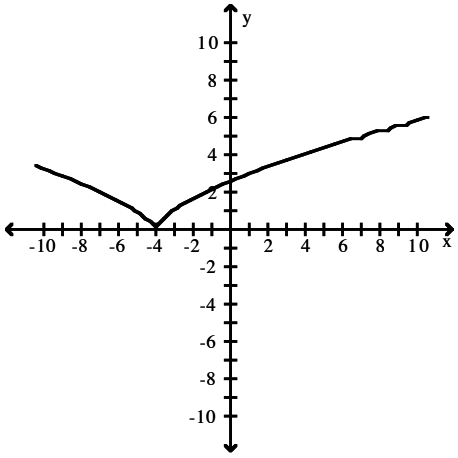


Answer: D

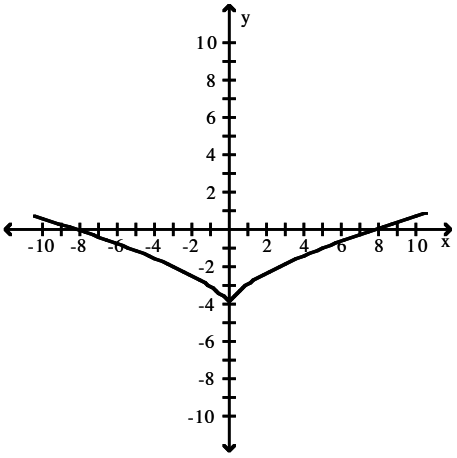
133) $y - 4 = x^{2/3}$



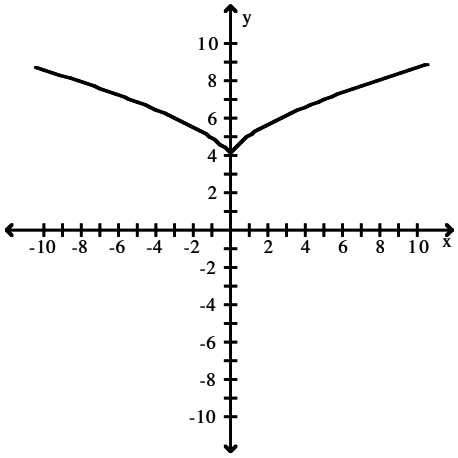
A)



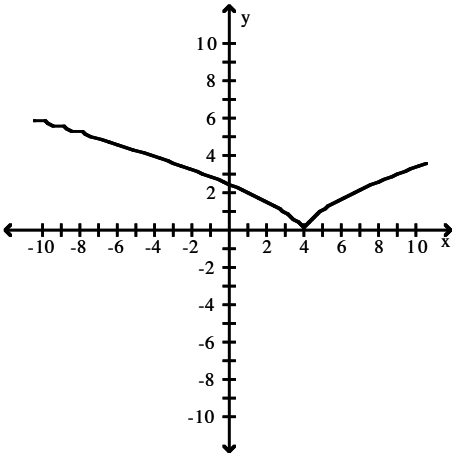
B)



C)

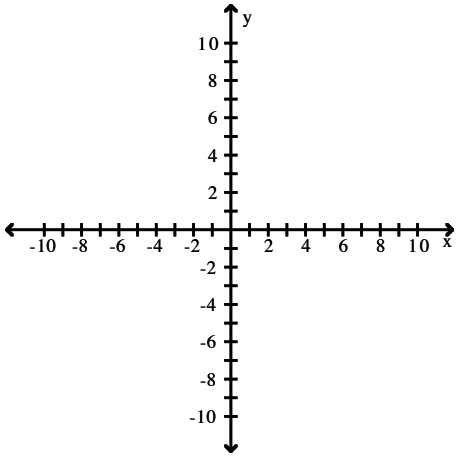


D)

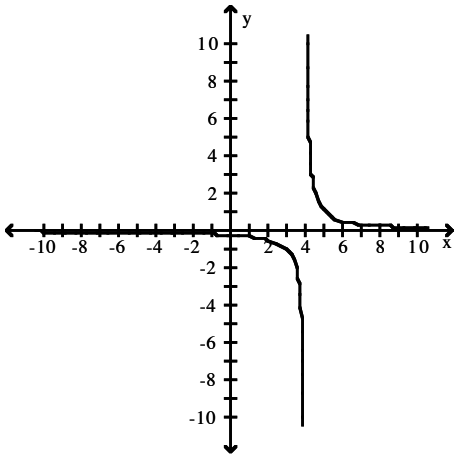


Answer: C

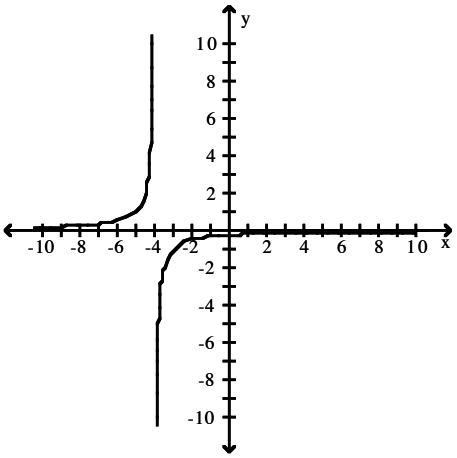
134) $y = \frac{1}{x - 4}$



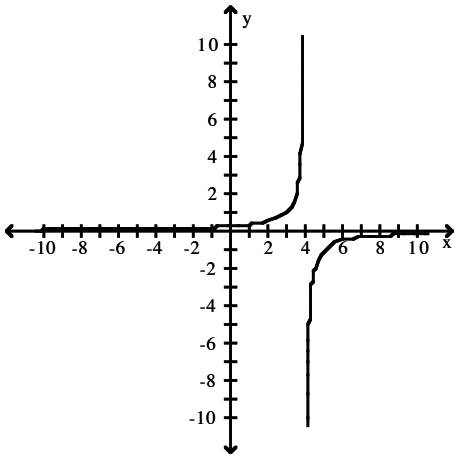
A)



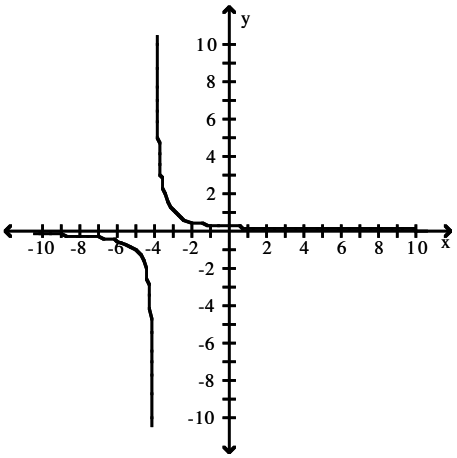
B)



C)

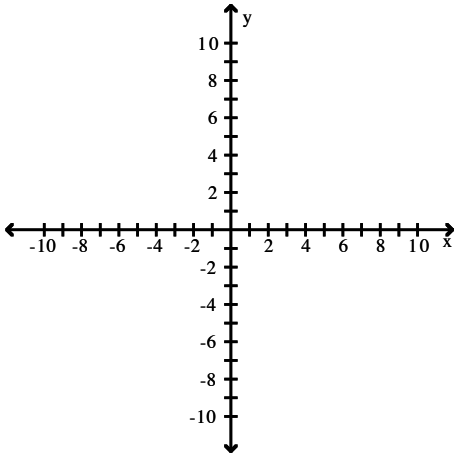


D)

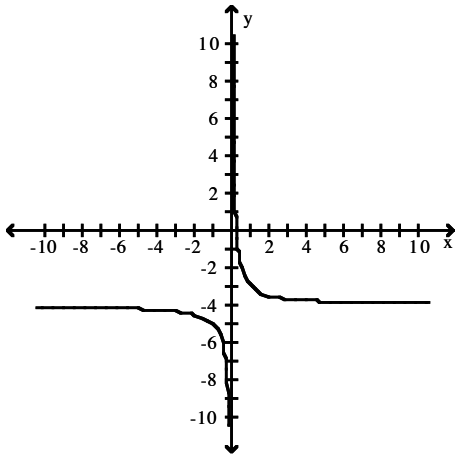


Answer: A

135) $y = \frac{1}{x} + 4$



A)



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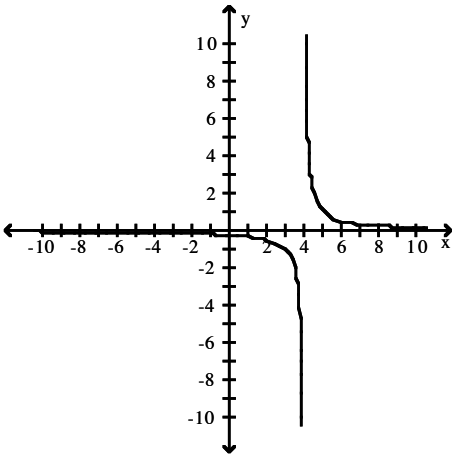
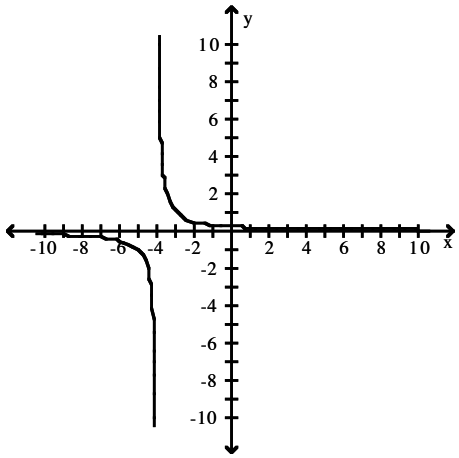
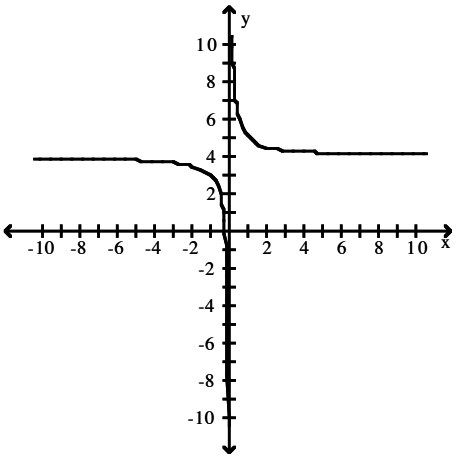


C)

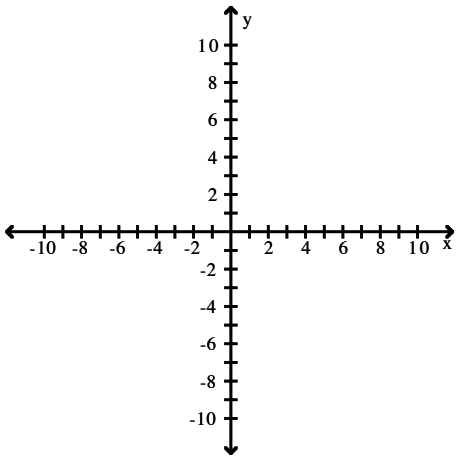


D)

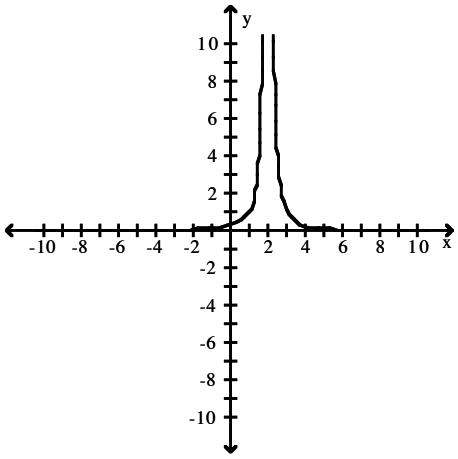


Answer: D

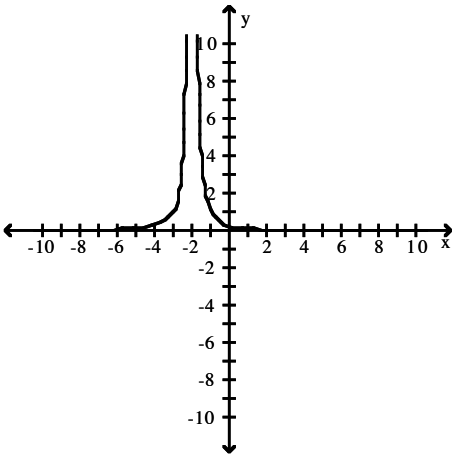
136) $y = \frac{1}{x^2} + 2$



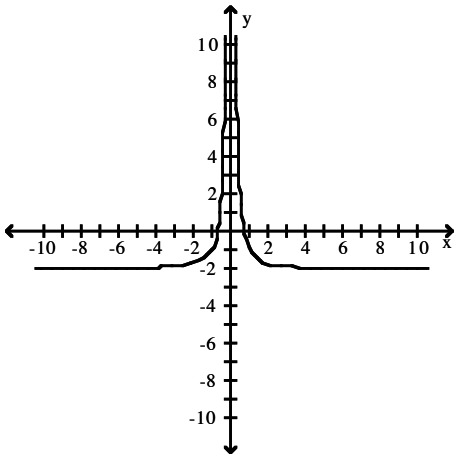
A)



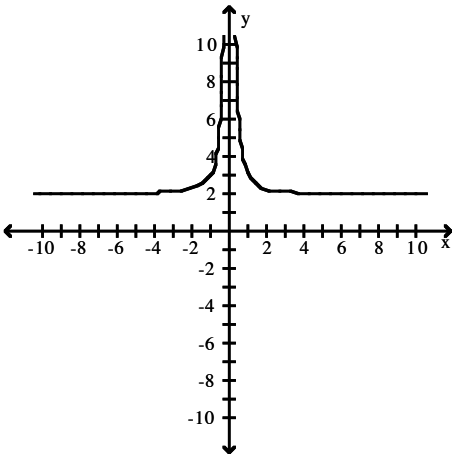
B)



C)

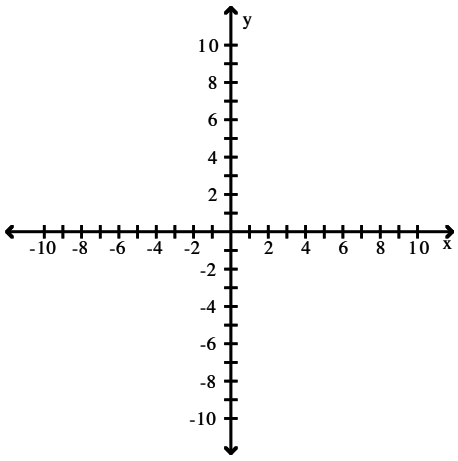


D)

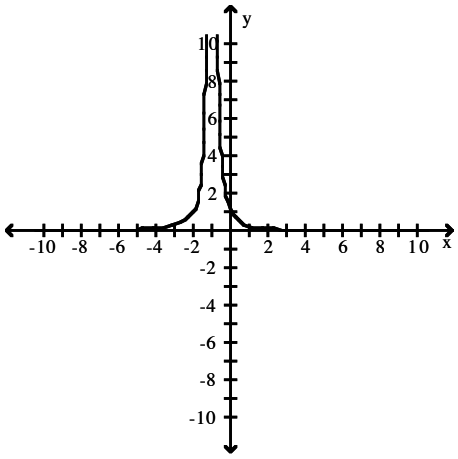


Answer: D

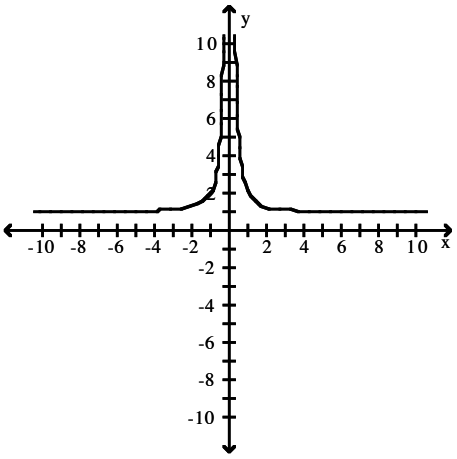
137) $y = \dfrac{1}{(x-1)^2}$



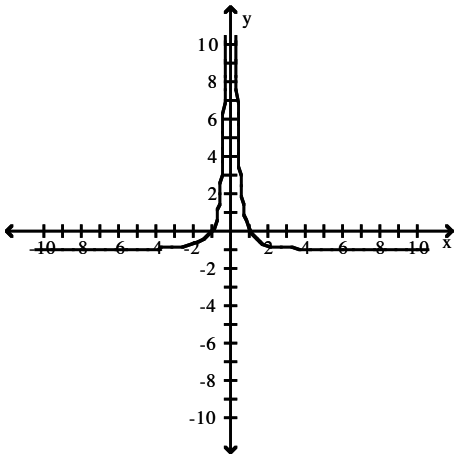
A)



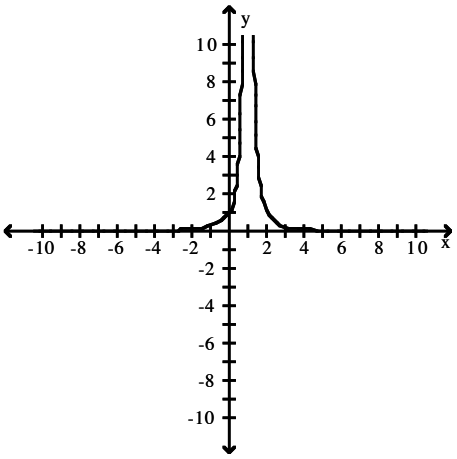
B)



C)

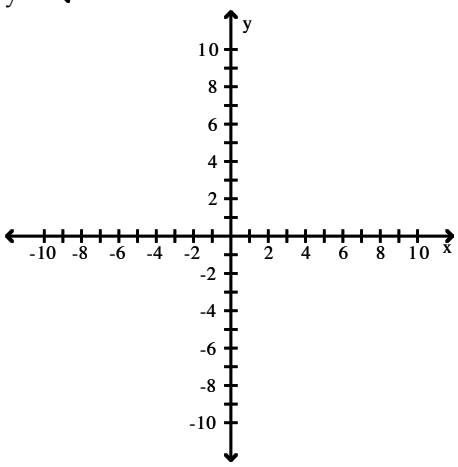


D)

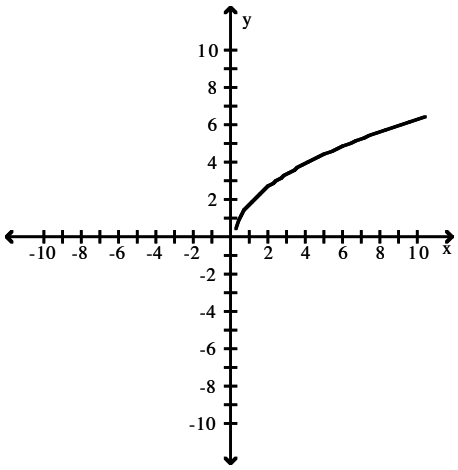


Answer: D

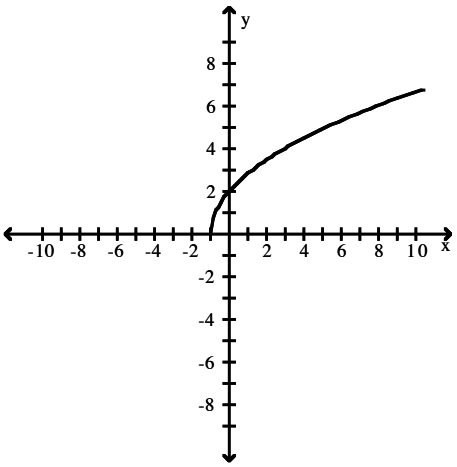
138) $y = \sqrt{4x - 4}$



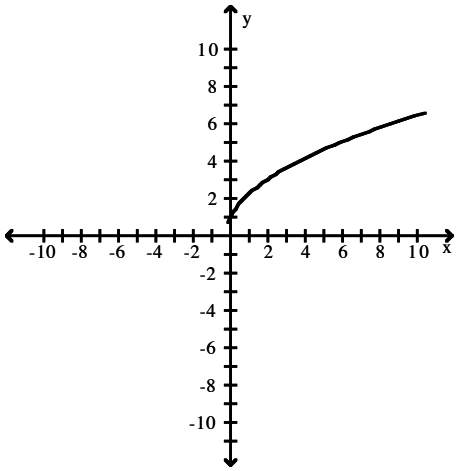
A)



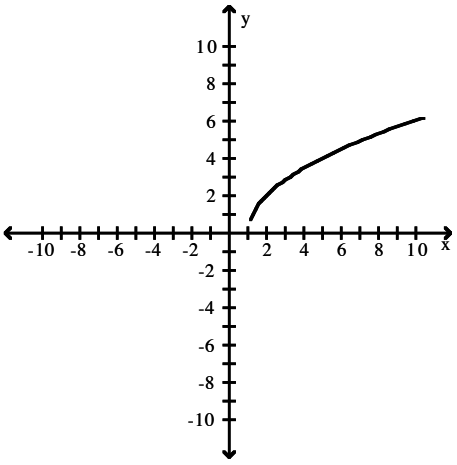
B)



C)

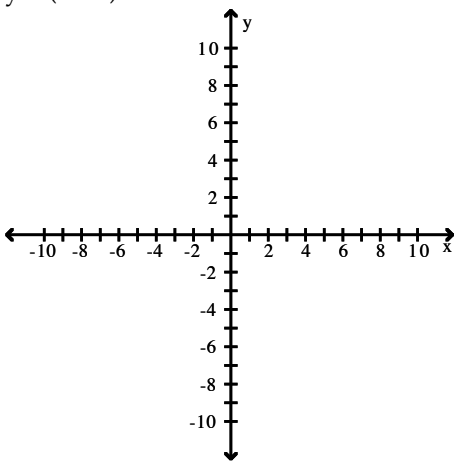


D)

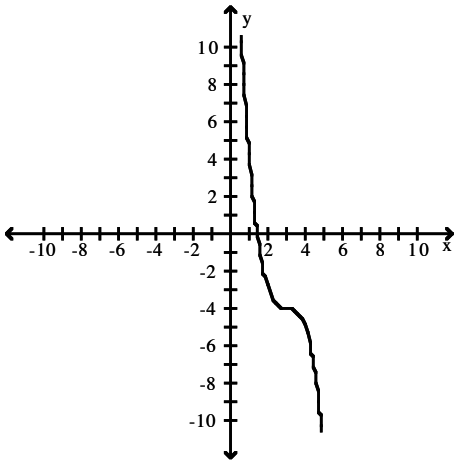


Answer: D

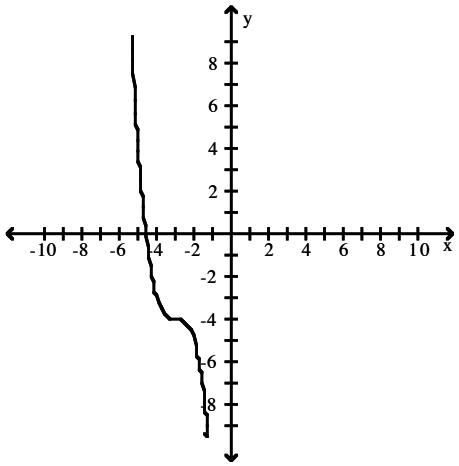
139) $y = (3 - x)^3 - 4$



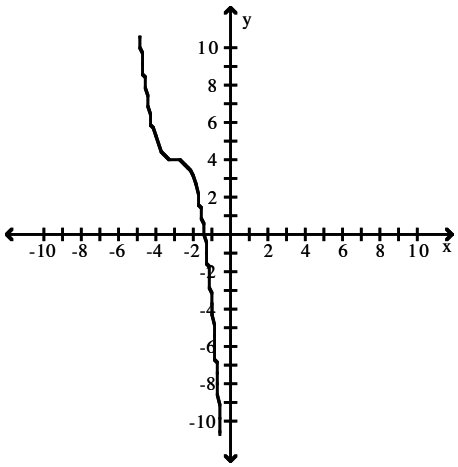
A)



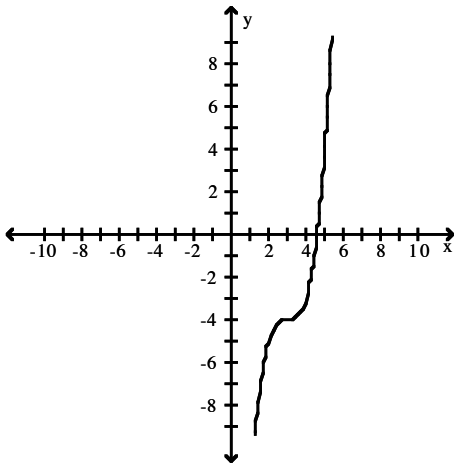
B)



C)

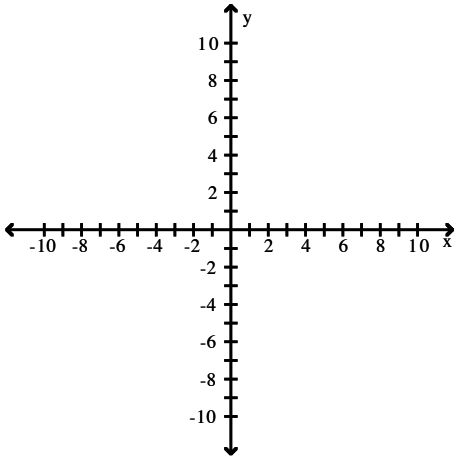


D)

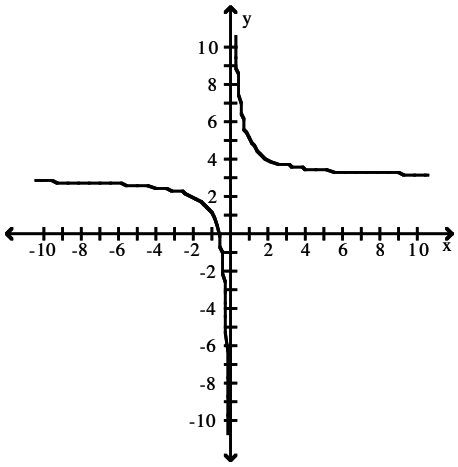


Answer: A

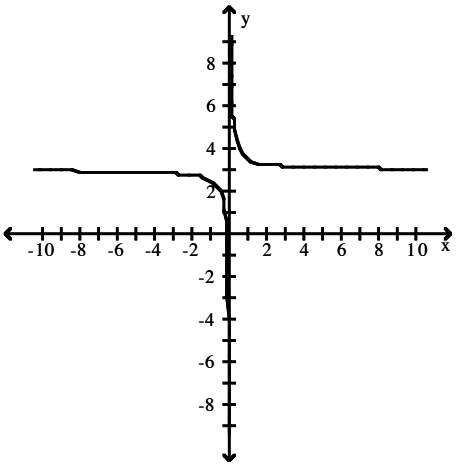
140) $y = \frac{1}{2x} - 3$



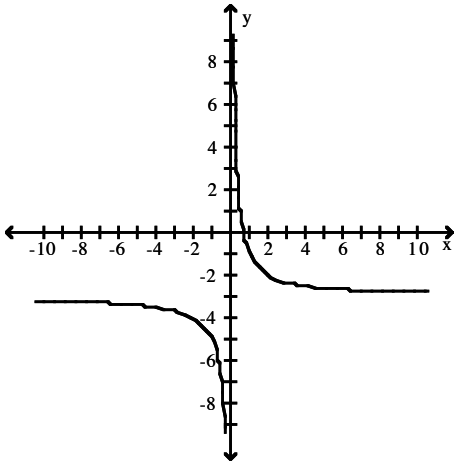
A)



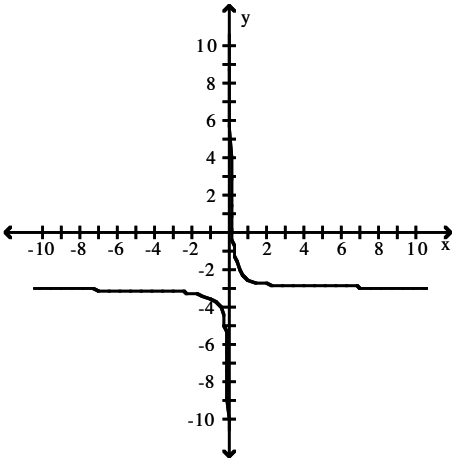
B)



C)

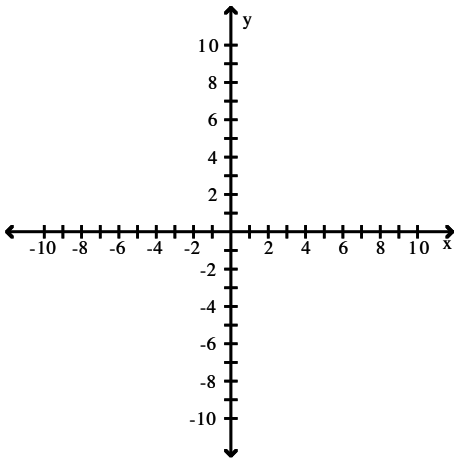


D)

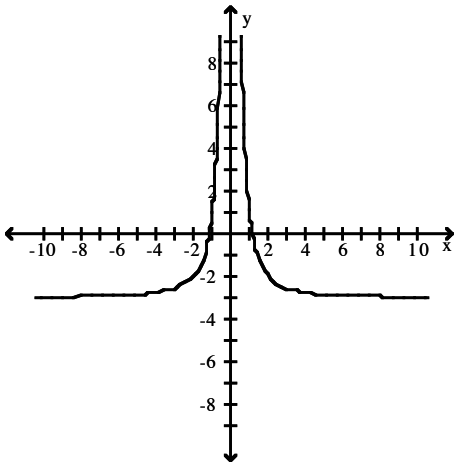


Answer: D

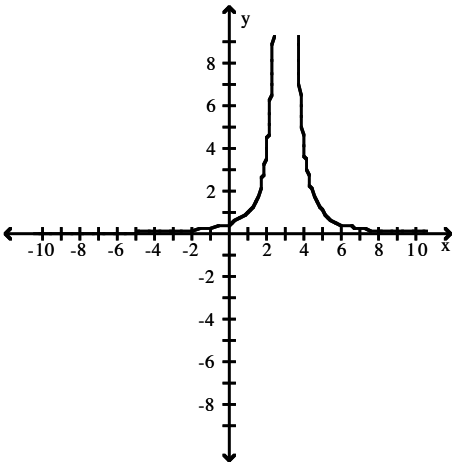
141) $y = \frac{4}{x^2} + 3$



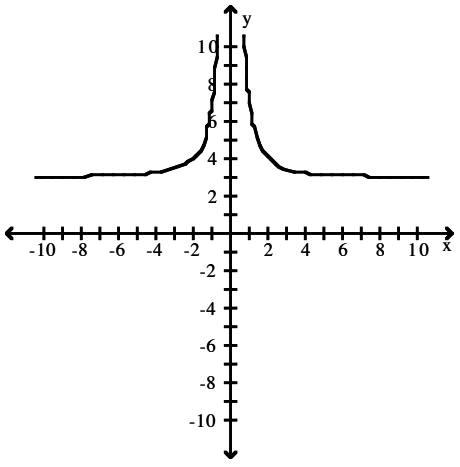
A)



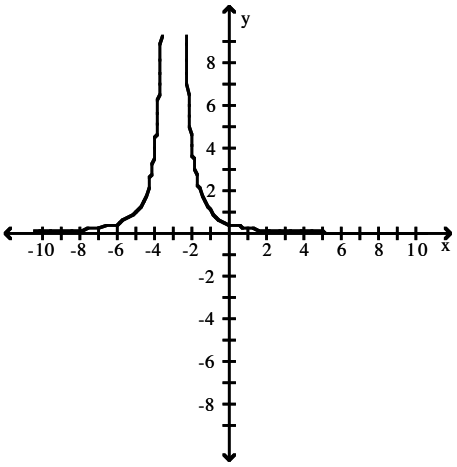
B)



C)

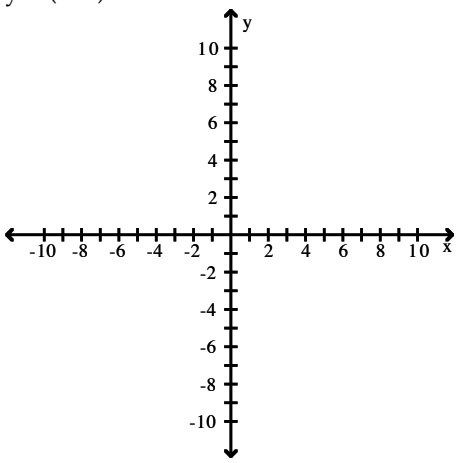


D)

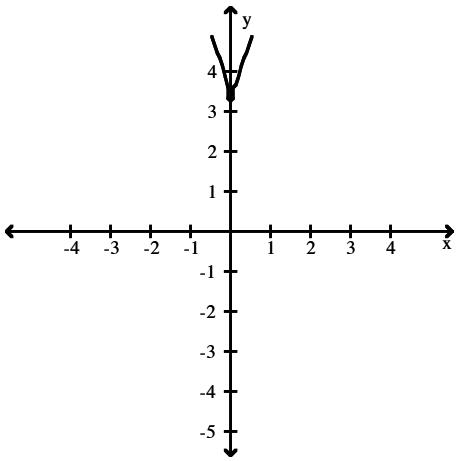


Answer: C

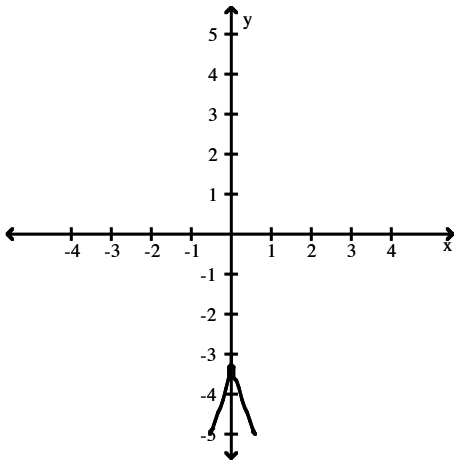
142) $y = (-5x)^{2/3} + 3$



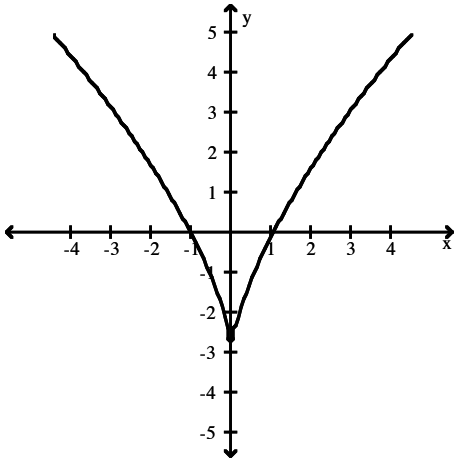
A)



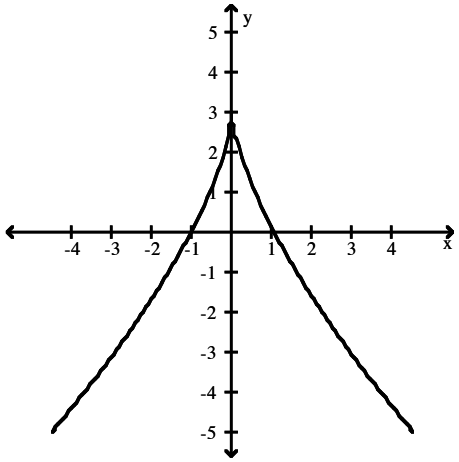
B)



C)

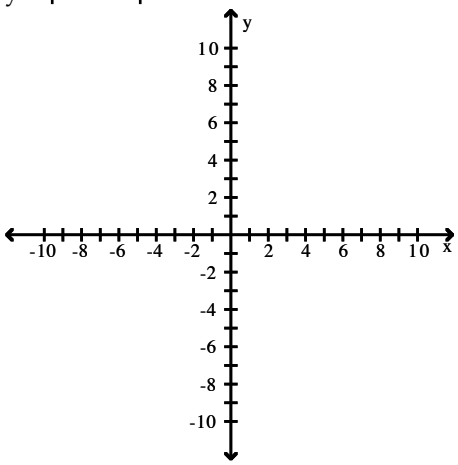


D)

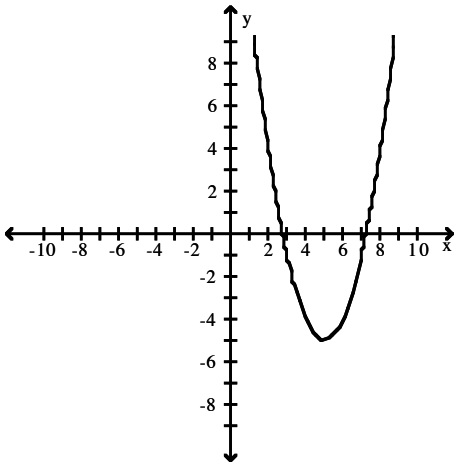


Answer: A

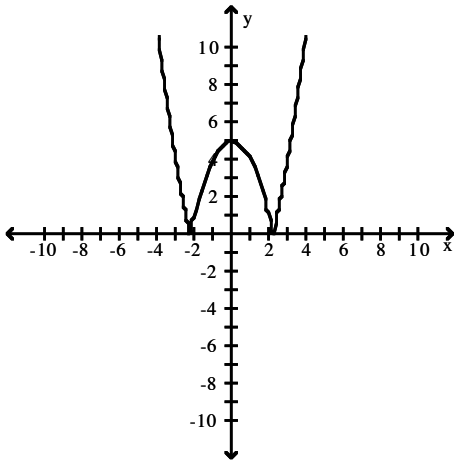
143) $y = |x^2 - 5|$



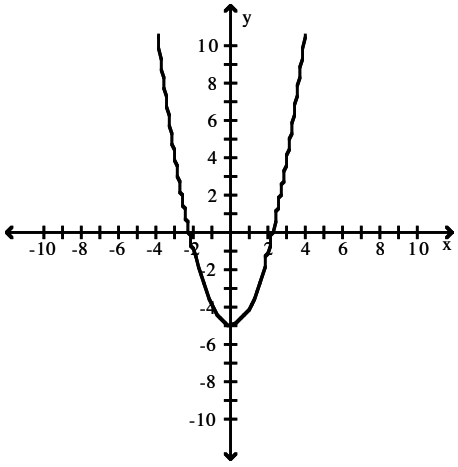
A)



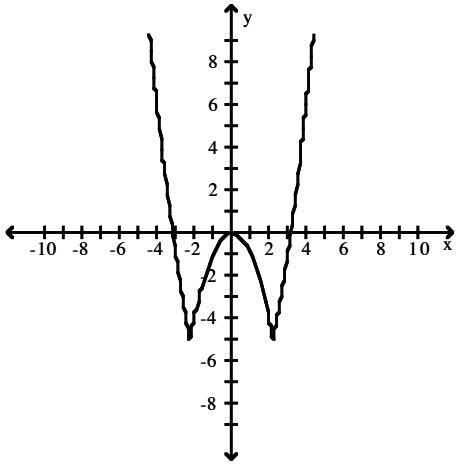
B)



C)

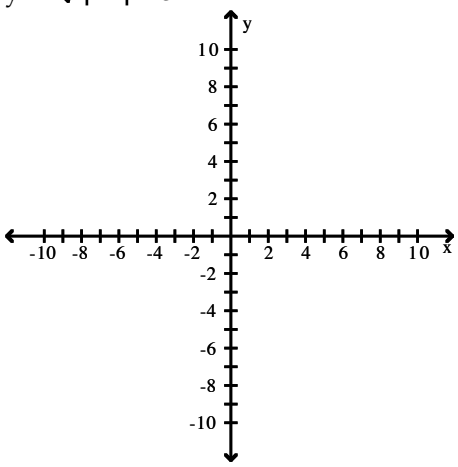


D)

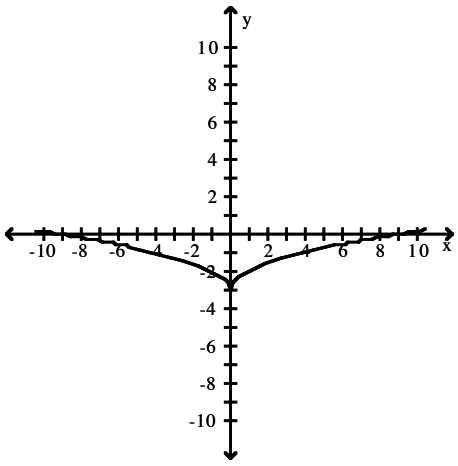


Answer: B

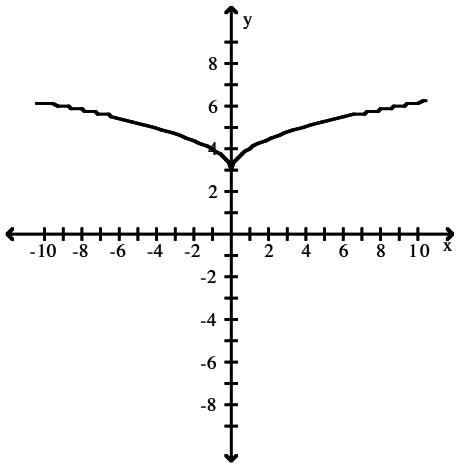
144) $y = \sqrt{|x|} - 3$



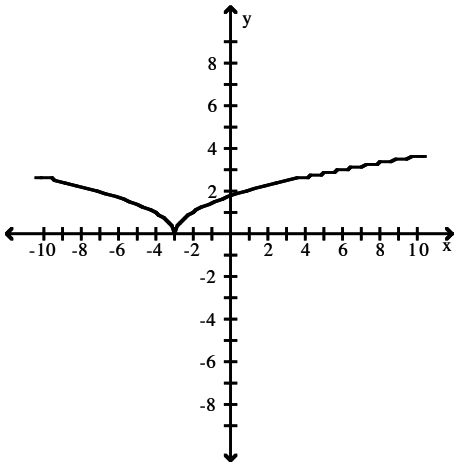
A)



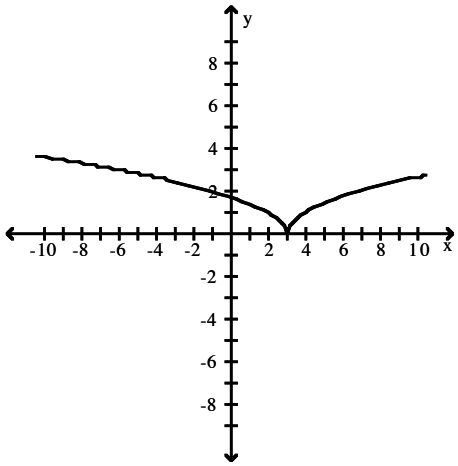
B)



C)

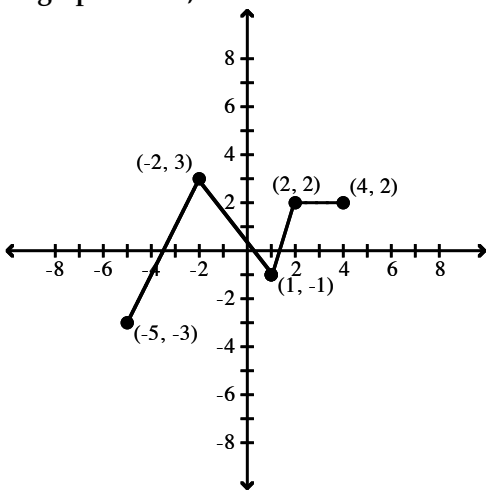


D)

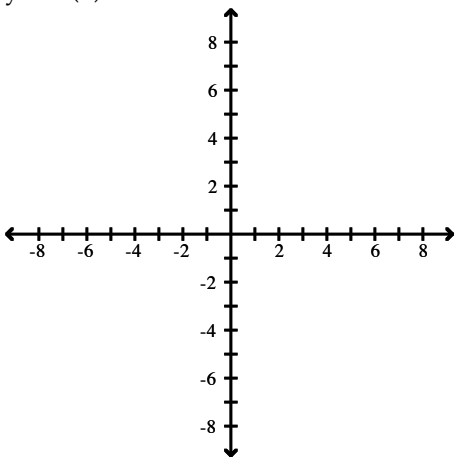


Answer: A

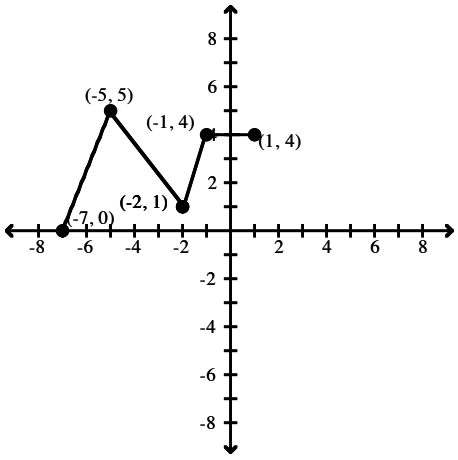
Using the graph below, find the domain and range of the given function, and sketch the graph.



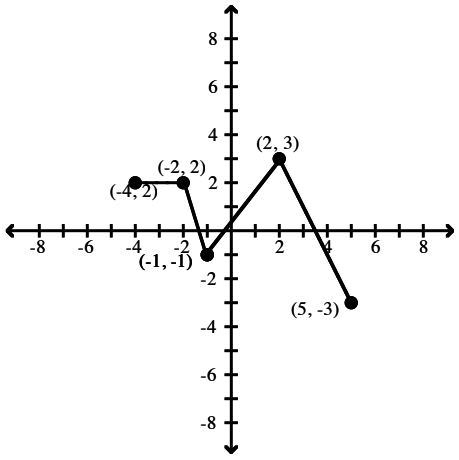
145) y = –f(x)



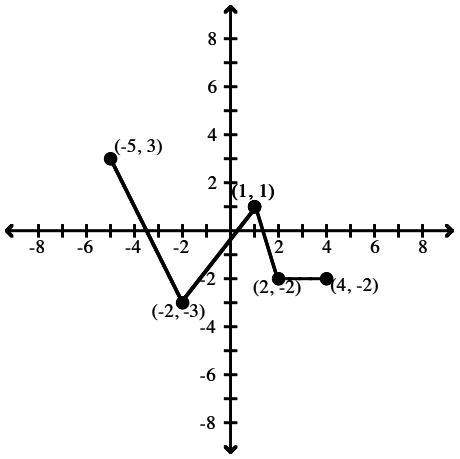
A) D: [–7.5, 1]; R: [–1, 5]



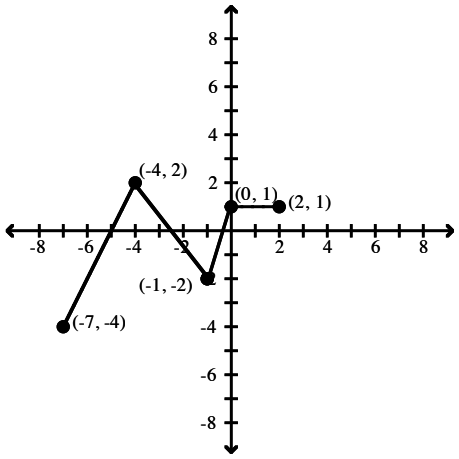
B) D: [–4, 5]; R: [–3, 3]



C) D: [–5, 4]; R: [–3, 3]

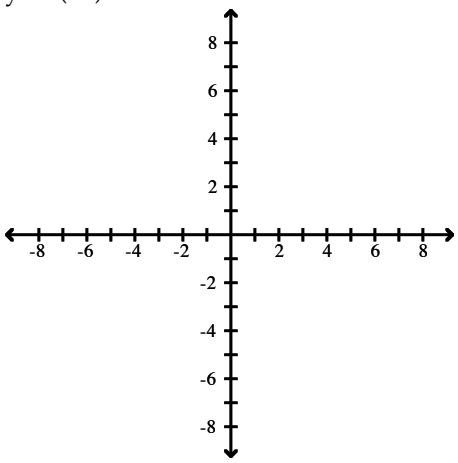


D) D: [–7, 2]; R: [–4, 2]

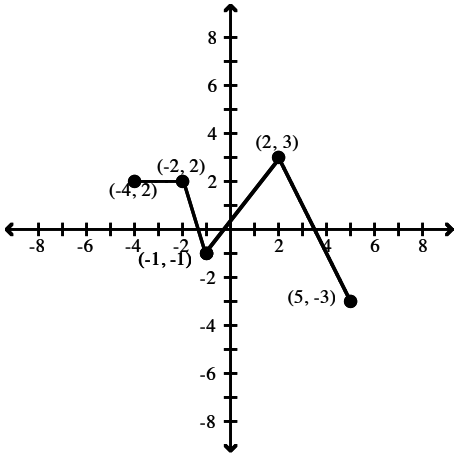


Answer: C

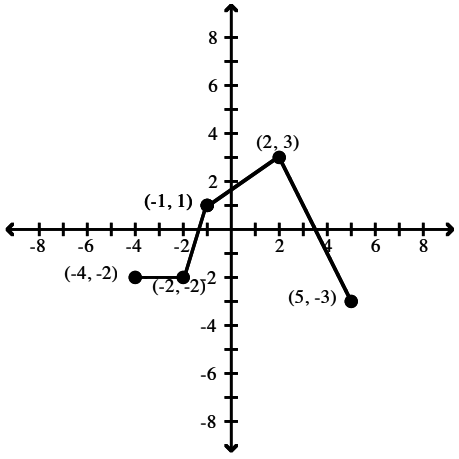
146) y = f(–x)



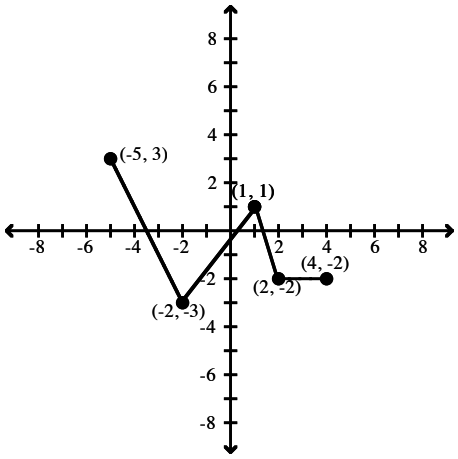
A) D: [–4, 5]; R: [–3, 3]



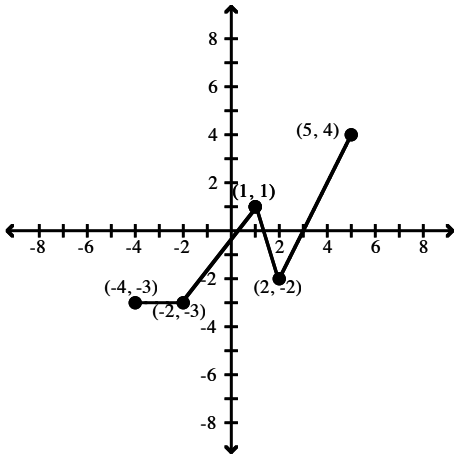
B) D: [–4, 5]; R: [–3, 3]



C) D: [–5, 4]; R: [–3, 3]

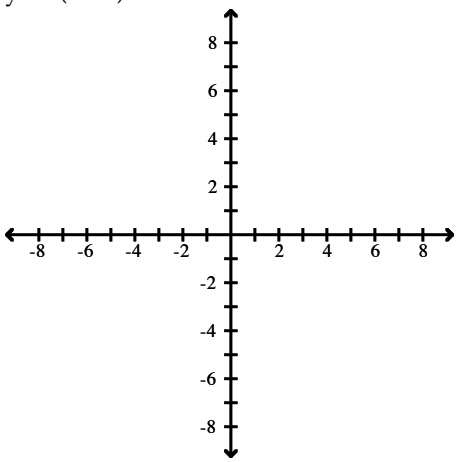


D) D: [–4, 5]; R: [–3, 4]

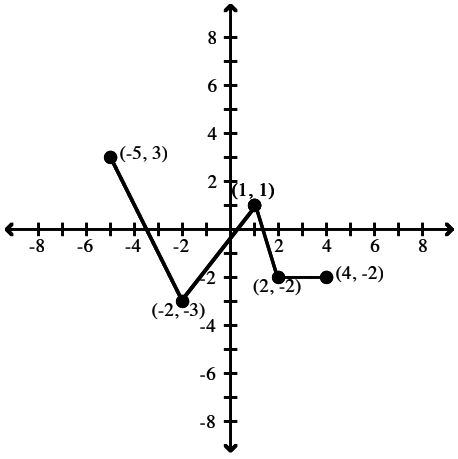


Answer: A

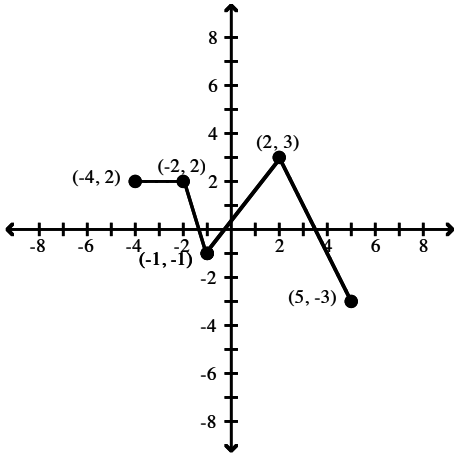
147) $y = f(x + 2) - 1$



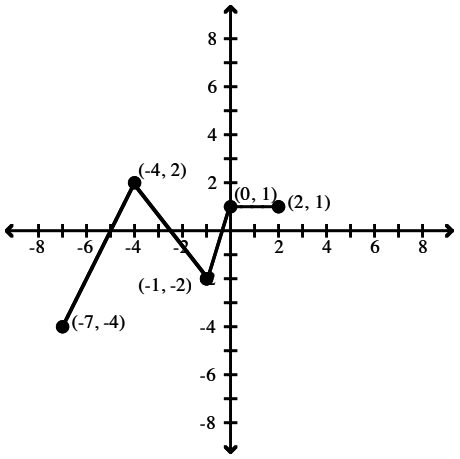
A) D: [–5, 4]; R: [–3, 3]



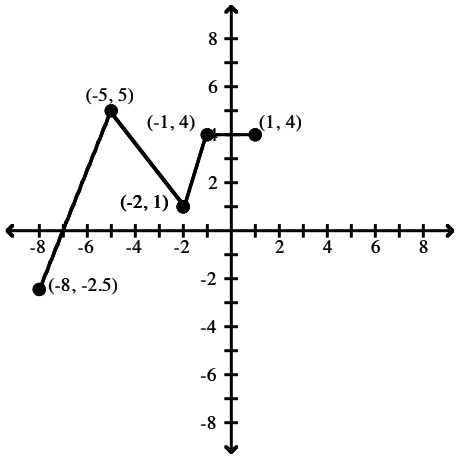
B) D: [–4, 5]; R: [–3, 3]



C) D: [–7, 2]; R: [–4, 2]

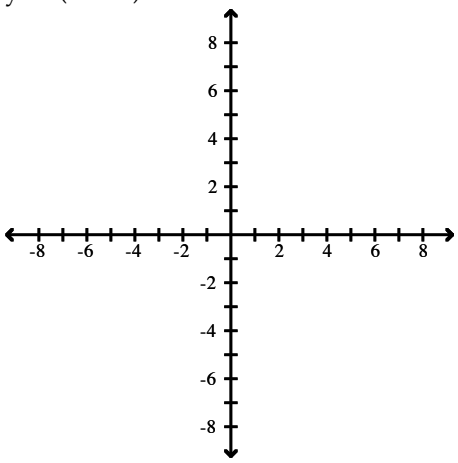


D) D: [–8, 1]; R: [–2.5, 5]

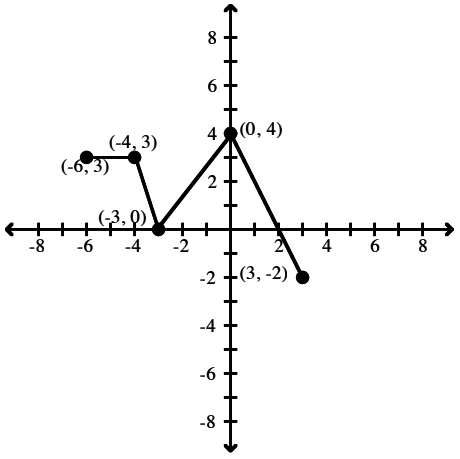


Answer: C

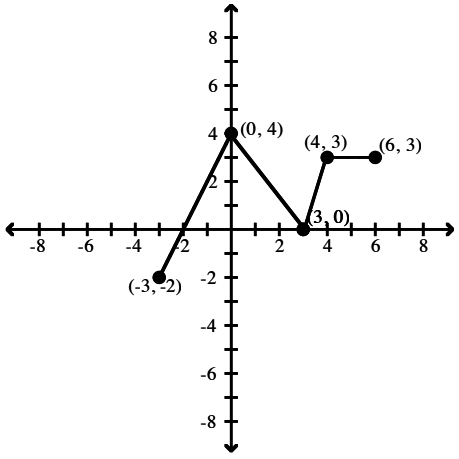
148) $y = f(-x - 2) + 1$



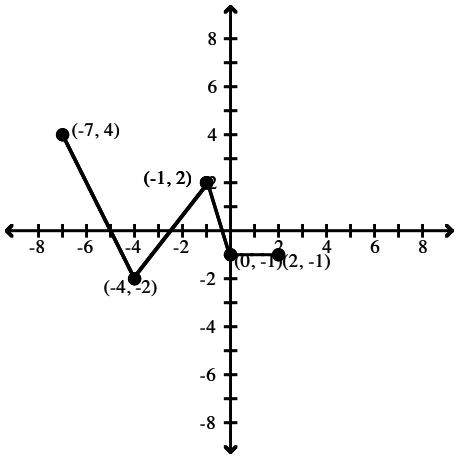
A) D: [–6, 3]; R: [–2, 4]



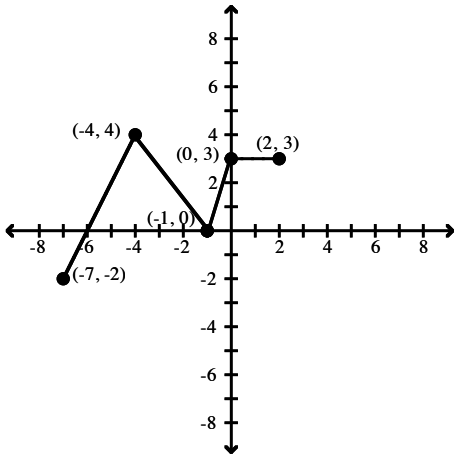
B) D: [–3, 6]; R: [–2, 4]



C) D: [–7, 2]; R: [–2, 4]



D) D: [–7, 2]; R: [–2, 4]



Answer: A

The problem tells by what factor and direction the graph of the given function is to be stretched or compressed. Give an equation for the stretched or compressed graph.

149) $y = x^2 + 3$ stretched horizontally by a factor of 5

A) $y = \frac{x^2}{5} + 3$ B) $y = \frac{x^2}{25} + 3$ C) $y = 25x^2 + 3$ D) $y = 5x^2 + 15$

Answer: B

150) $y = x^2 + 4$ compressed vertically by a factor of 5

A) $y = \frac{x^2}{5} + \frac{4}{5}$ B) $y = 5x^2 + 20$ C) $y = 25x^2 + 4$ D) $y = \frac{x^2}{5} + 4$

Answer: A

151) $y = 1 + \frac{1}{x^2}$ stretched vertically by a factor of 4

A) $y = 4 + \frac{4}{x^2}$ B) $y = 1 + \frac{4}{x^2}$ C) $y = 1 + \frac{16}{x^2}$ D) $y = \frac{1}{4} + \frac{1}{4x^2}$

Answer: A

152) $y = 1 + \frac{1}{x^2}$ compressed horizontally by a factor of 9

A) $y = \frac{1}{9} + \frac{1}{9x^2}$ B) $y = 9 + \frac{9}{x^2}$ C) $y = 1 + \frac{81}{x^2}$ D) $y = 1 + \frac{1}{81x^2}$

Answer: D

153) $y = \sqrt{x+1}$ compressed vertically by a factor of 5

A) $y = 5\sqrt{x+1}$ B) $y = \sqrt{5x+5}$ C) $y = \sqrt{5x+1}$ D) $y = \frac{\sqrt{x+1}}{5}$

Answer: D

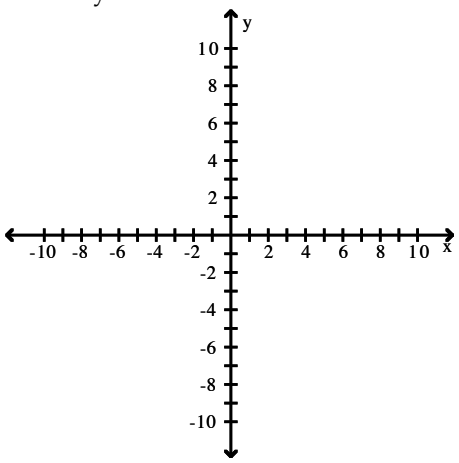
154) $y = x^3 + 1$ stretched vertically by a factor of 3

A) $y = 3x^3 + 1$ B) $y = \frac{x^3}{3} + \frac{1}{3}$ C) $y = 27x^3 + 1$ D) $y = 3x^3 + 3$

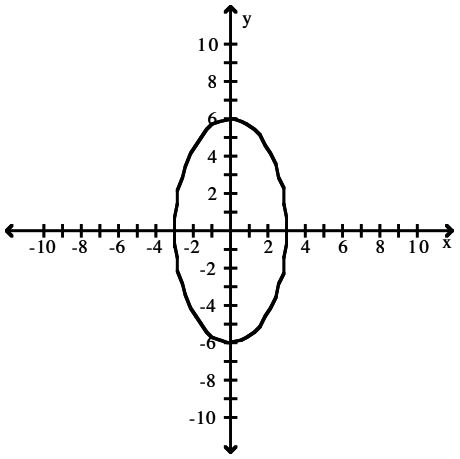
Answer: D

The equation of an ellipse is given. Put the equation in standard form and sketch the ellipse.

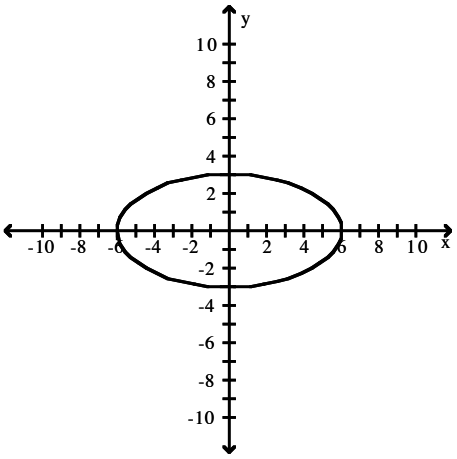
155) $9x^2 + 36y^2 = 324$



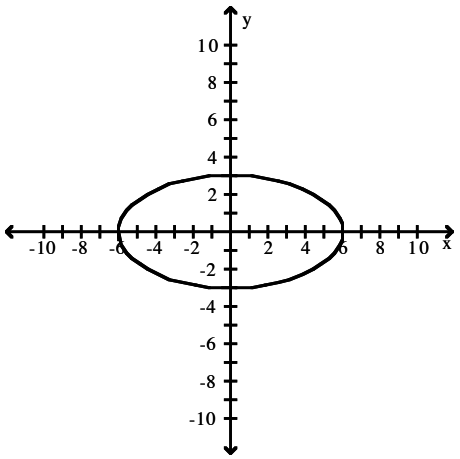
A) $\frac{x^2}{9} + \frac{y^2}{36} = 1$



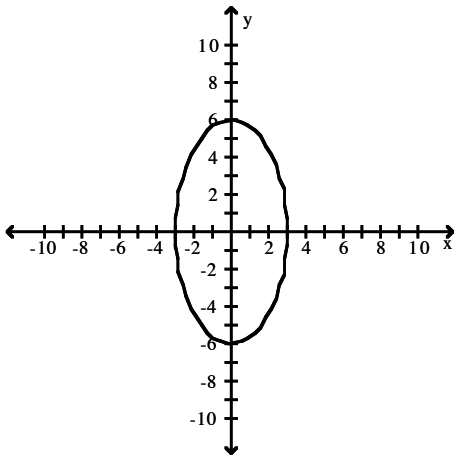
B) $\frac{x^2}{36} + \frac{y^2}{9} = 1$



C) $\frac{x^2}{9}+\frac{y^2}{36}=1$

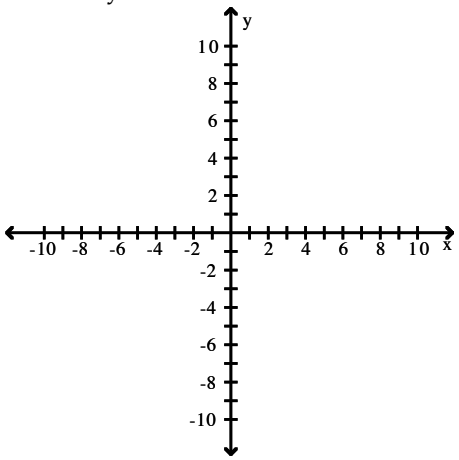


D) $\frac{x^2}{36}+\frac{y^2}{9}=1$

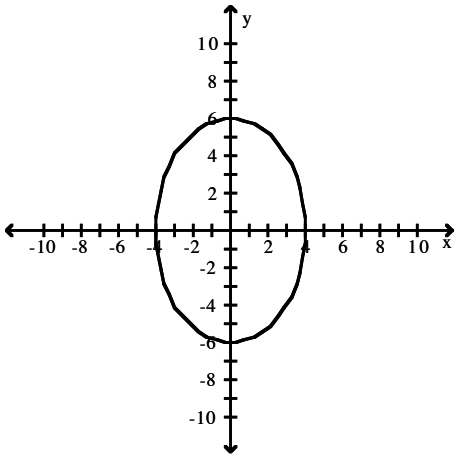


Answer: B

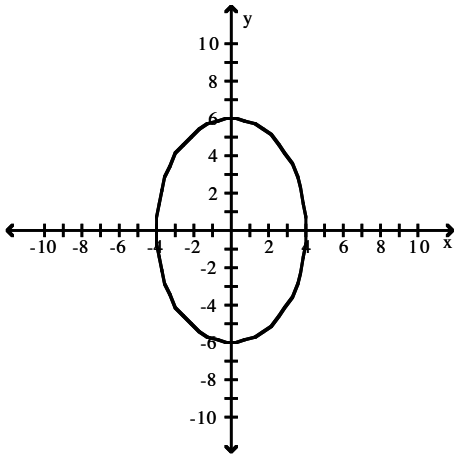
156) $36x^2+16y^2=576$



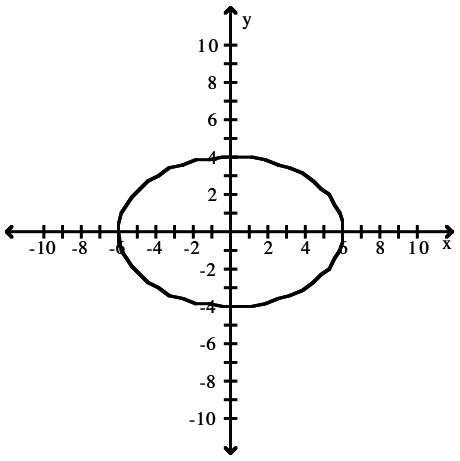
A) $\frac{x^2}{16}+\frac{y^2}{36}=1$



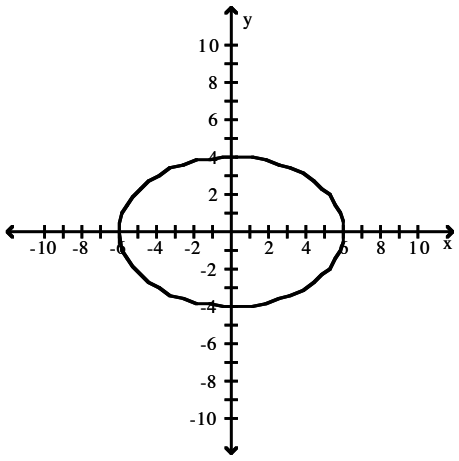
B) $\frac{x^2}{36}+\frac{y^2}{16}=1$



C) $\frac{x^2}{16}+\frac{y^2}{36}=1$

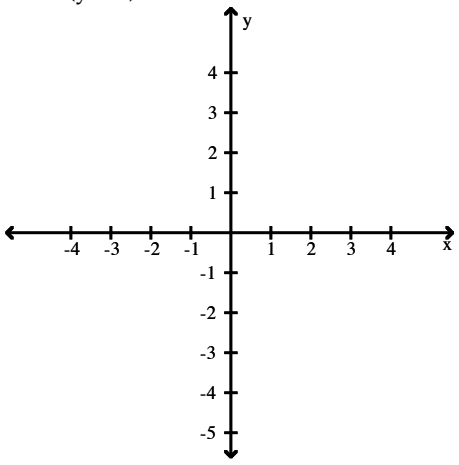


D) $\frac{x^2}{36}+\frac{y^2}{16}=1$

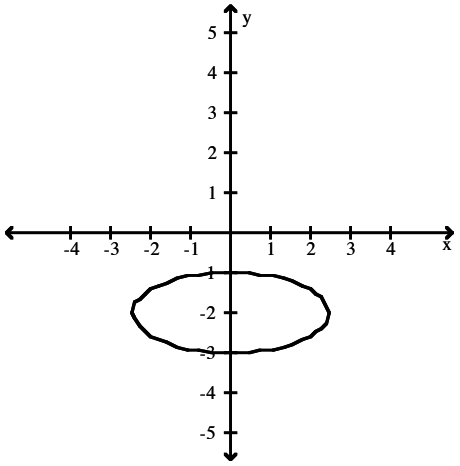


Answer: A

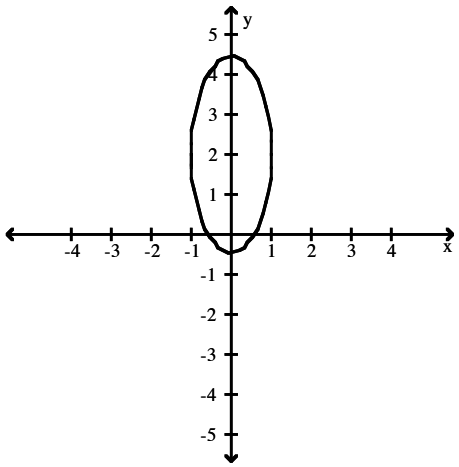
157) $6x^2+(y+2)^2=6$



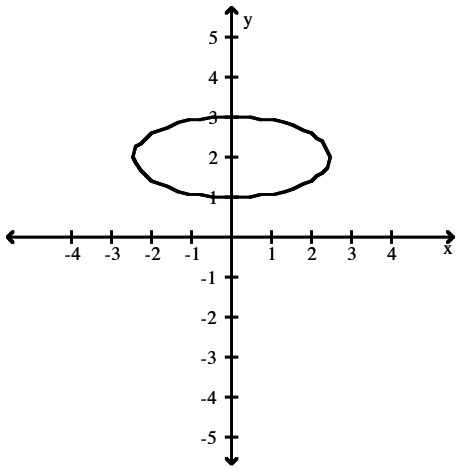
A) $\frac{x^2}{6}+(y+2)^2=1$



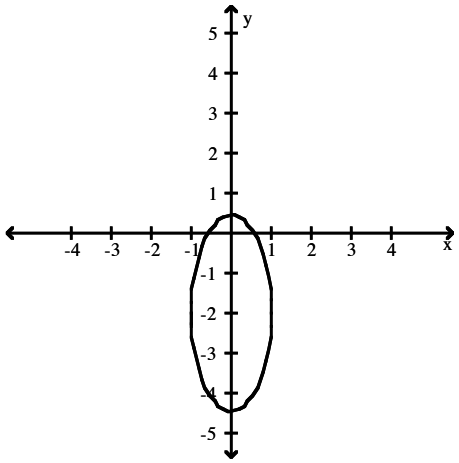
B) $x^2+\frac{(y+2)^2}{6}=1$



C) $\frac{x^2}{6}+(y+2)^2=1$

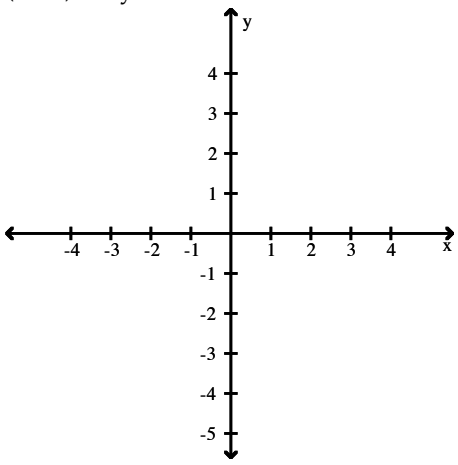


D) $x^2+\frac{(y+2)^2}{6}=1$

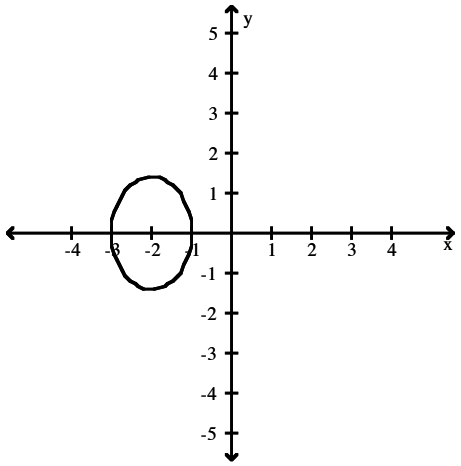


Answer: D

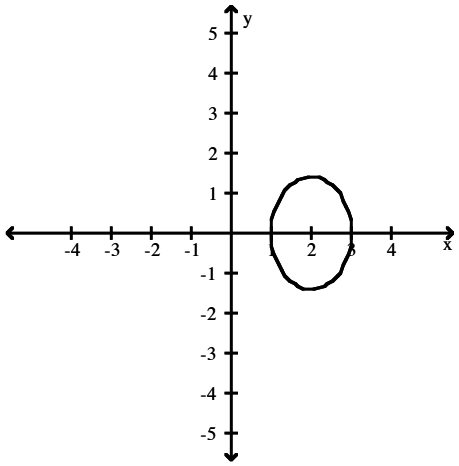
158) $(x+2)^2+2y^2=2$



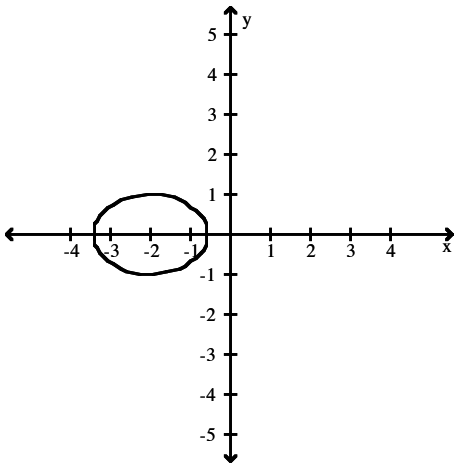
A) $(x+2)^2+\frac{y^2}{2}=1$



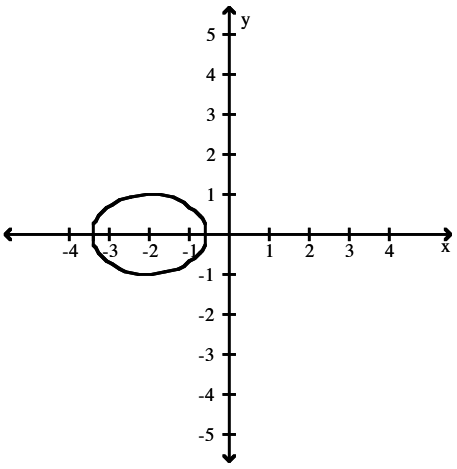
B) $(x+2)^2+\frac{y^2}{2}=1$



C) $\frac{(x+2)^2}{2}+y^2=1$

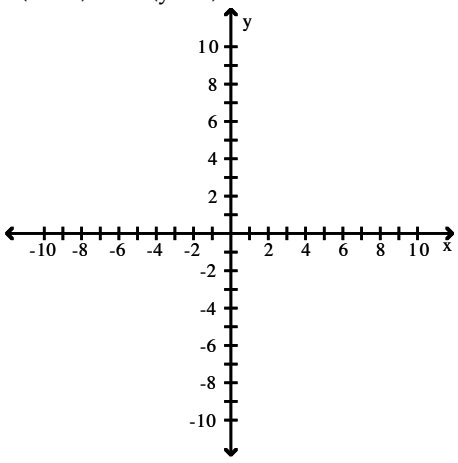


D) $\frac{(x+2)^2}{2}+y^2=1$

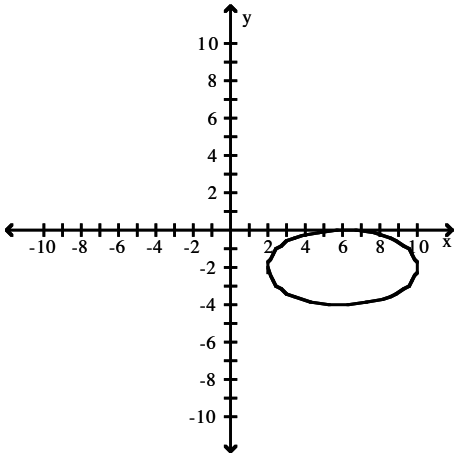


Answer: C

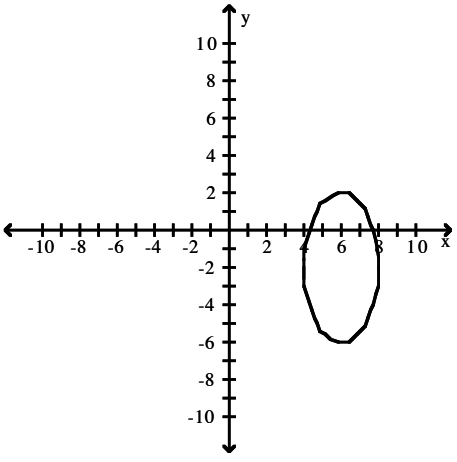
159) $4(x-6)^2+16(y+2)^2=64$



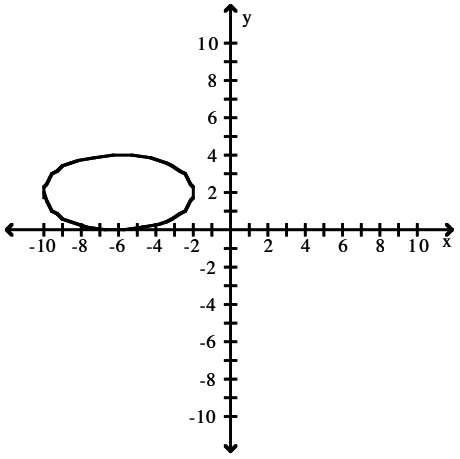
A) $\frac{(x-6)^2}{16}+\frac{(y+2)^2}{4}=1$



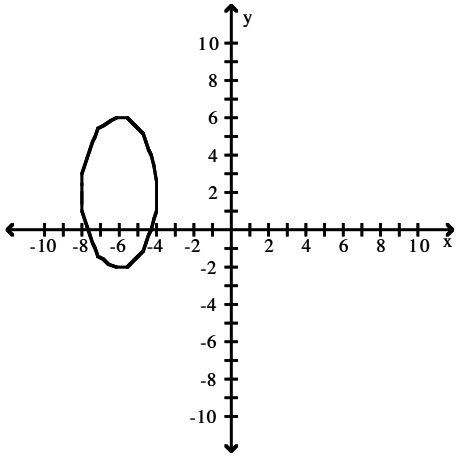
B) $\frac{(x-6)^2}{4}+\frac{(y+2)^2}{16}=1$



C) $\frac{(x-6)^2}{16}+\frac{(y+2)^2}{4}=1$



D) $\frac{(x-6)^2}{4}+\frac{(y+2)^2}{16}=1$



Answer: A

Assume that f is an even function, g is an odd function, and both f and g are defined on the entire real line. State whether the combination of functions (where defined) is even or odd.

160) fg

A) Even B) Odd

Answer: B

161) f/g

A) Even B) Odd

Answer: B

162) f^2

A) Even B) Odd

Answer: A

163) g ∘ f

A) Even B) Odd

Answer: A

164) f ∘ f

A) Even B) Odd

Answer: A

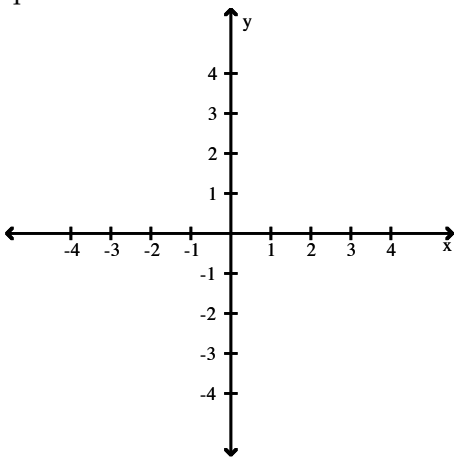
165) g ∘ g

A) Even B) Odd

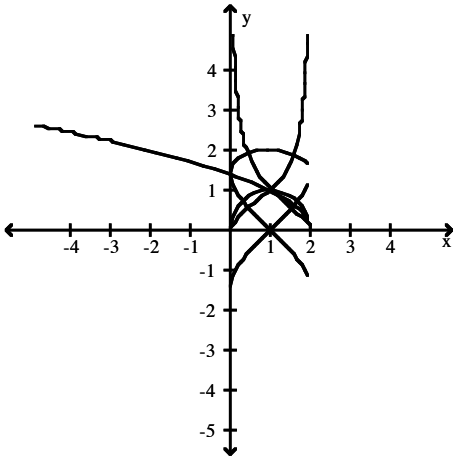
Answer: B

Solve the problem.

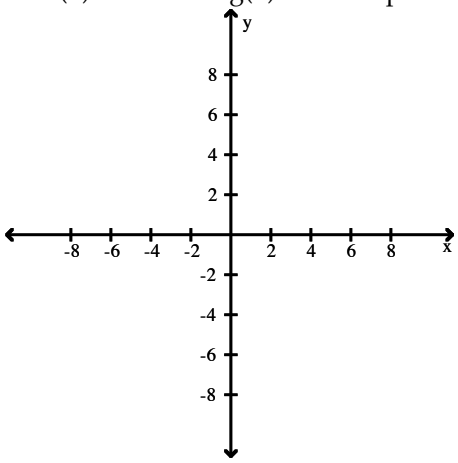
166) Graph the functions $f(x) = \sqrt{x}$ and $g(x) = \sqrt{2 - x}$ together with their sum, product, two differences, and two quotients.



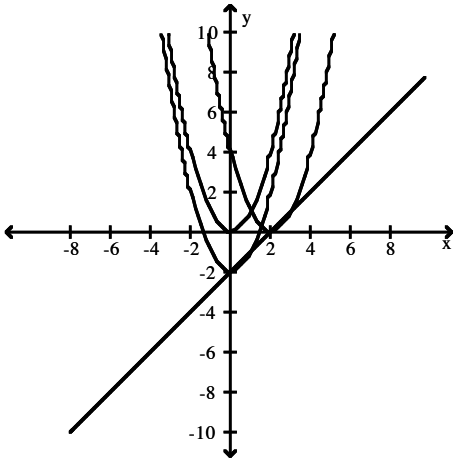
Answer:



167) Let $f(x) = x - 2$ and $g(x) = x^2$. Graph f and g together with $f \circ g$ and $g \circ f$.



Answer:



168) On a circle of radius 8 meters, how long is an arc that subtends a central angle of $\frac{5\pi}{2}$ radians?

A) 4π m B) 20π m C) 40 m D) 20 m

Answer: B

169) On a circle of radius 6 meters, how long is an arc that subtends a central angle of 85°?

A) $\frac{17\pi}{6}$ m B) $\frac{17}{6}$ m C) 510 m D) 510π m

Answer: A

170) You want to make an angle measuring 60° by marking an arc on the perimeter of a disk with a diameter of 14 inches and drawing lines from the ends of the arc to the disk's center. To the nearest tenth of an inch, how long should the arc be?

A) 29.3 in. B) 3.7 in. C) 7.3 in. D) 14.7 in.

Answer: C

171) If you roll a 1–m–diameter wheel forward 31 centimeters over level ground, through what angle (to the nearest degree) will the wheel turn?

A) 1° B) 36° C) 62° D) 18°

Answer: B

Find the exact value of the trigonometric function. Do not use a calculator or tables.

172) $\sec\left(\frac{\pi}{6}\right)$

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

Answer: A

173) $\csc\left(\frac{\pi}{3}\right)$

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

Answer: C

174) $\sin\left(\frac{\pi}{4}\right)$

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

Answer: A

175) $\sin\left(\frac{7\pi}{4}\right)$

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

Answer: B

176) $\cos\left(\frac{11\pi}{6}\right)$

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

Answer: C

177) $\tan\left(\frac{4\pi}{3}\right)$

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

Answer: C

178) $\tan\left(\frac{3\pi}{2}\right)$

A) –1 B) 1 C) 0 D) Undefined

Answer: D

179) cot (2π)

A) 0 B) –1 C) 1 D) Undefined

Answer: D

One of sin x, cos x, and tan x is given. Find the other two if x lies in the specified interval.

180) $\sin x = \frac{4}{5}, \quad x \text{ in } \left[\frac{\pi}{2}, \pi\right]$

A) $\cos x = \frac{3}{5}, \tan x = -\frac{3}{4}$ B) $\cos x = \frac{3}{5}, \tan x = \frac{4}{3}$

C) $\cos x = -\frac{3}{5}, \tan x = -\frac{3}{4}$ D) $\cos x = -\frac{3}{5}, \tan x = -\frac{4}{3}$

Answer: D

181) $\cos x = \frac{5}{13}, \quad x \text{ in } \left[-\frac{\pi}{2}, 0\right]$

A) $\sin x = \frac{12}{13}, \tan x = -\frac{5}{12}$ B) $\sin x = -\frac{12}{13}, \tan x = -\frac{5}{12}$

C) $\sin x = \frac{12}{13}, \tan x = \frac{12}{5}$ D) $\sin x = -\frac{12}{13}, \tan x = -\frac{12}{5}$

Answer: D

182) $\tan x = \frac{4}{3}, \quad x \text{ in } \left[\pi, \frac{3\pi}{2}\right]$

A) $\sin x = -\frac{4}{5}, \cos x = -\frac{3}{5}$ B) $\sin x = -\frac{3}{5}, \cos x = -\frac{4}{5}$

C) $\sin x = \frac{4}{5}, \cos x = \frac{3}{5}$ D) $\sin x = \frac{3}{5}, \cos x = \frac{4}{5}$

Answer: A

183) $\sin x = -\frac{1}{5}, \quad x \text{ in } \left[-\frac{\pi}{2}, 0\right]$

A) $\cos x = \frac{2\sqrt{6}}{5}, \tan x = -\frac{\sqrt{6}}{12}$ B) $\cos x = \frac{2\sqrt{6}}{5}, \tan x = \frac{\sqrt{6}}{12}$

C) $\cos x = -\frac{2\sqrt{6}}{5}, \tan x = \frac{\sqrt{6}}{12}$ D) $\cos x = -\frac{2\sqrt{6}}{5}, \tan x = -\frac{\sqrt{6}}{12}$

Answer: A

184) $\cos x = -\frac{1}{5}, \quad x \text{ in } \left[\pi, \frac{3\pi}{2}\right]$

A) $\sin x = \frac{2\sqrt{6}}{5}, \tan x = 2\sqrt{6}$

B) $\sin x = -\frac{2\sqrt{6}}{5}, \tan x = 2\sqrt{6}$

C) $\sin x = -\frac{2\sqrt{6}}{5}, \tan x = -2\sqrt{6}$

D) $\sin x = \frac{2\sqrt{6}}{5}, \tan x = -2\sqrt{6}$

Answer: B

185) $\tan x = -\frac{5}{12}, \quad x \text{ in } \left[\frac{\pi}{2}, \pi\right]$

A) $\sin x = \frac{5}{13}, \cos x = -\frac{12}{13}$

B) $\sin x = \frac{5}{13}, \cos x = \frac{12}{13}$

C) $\sin x = -\frac{5}{13}, \cos x = \frac{12}{13}$

D) $\sin x = \frac{12}{13}, \cos x = -\frac{5}{13}$

Answer: A

186) $\sin x = -\frac{\sqrt{5}}{3}, \quad x \text{ in } \left[-\frac{\pi}{2}, 0\right]$

A) $\cos x = \frac{2}{3}, \tan x = \frac{\sqrt{5}}{2}$

B) $\cos x = -\frac{2}{3}, \tan x = \frac{\sqrt{5}}{2}$

C) $\cos x = -\frac{2}{3}, \tan x = -\frac{\sqrt{5}}{2}$

D) $\cos x = \frac{2}{3}, \tan x = -\frac{\sqrt{5}}{2}$

Answer: D

187) $\cos x = -\frac{\sqrt{2}}{2}, \quad x \text{ in } \left[-\frac{3\pi}{2}, -\pi\right]$

A) $\sin x = -\frac{\sqrt{2}}{2}, \tan x = 1$

B) $\sin x = \frac{\sqrt{2}}{2}, \tan x = -1$

C) $\sin x = -\frac{\sqrt{2}}{2}, \tan x = -1$

D) $\sin x = \frac{\sqrt{2}}{2}, \tan x = 1$

Answer: B

188) $\tan x = 1, \quad x \text{ in } \left[\pi, \frac{3\pi}{2}\right]$

A) $\sin x = -\frac{\sqrt{2}}{2}, \cos x = \frac{\sqrt{2}}{2}$

B) $\sin x = \frac{\sqrt{2}}{2}, \cos x = -\frac{\sqrt{2}}{2}$

C) $\sin x = -\frac{\sqrt{2}}{2}, \cos x = -\frac{\sqrt{2}}{2}$

D) $\sin x = \frac{\sqrt{2}}{2}, \cos x = \frac{\sqrt{2}}{2}$

Answer: C

189) $\sin x = -\frac{\sqrt{3}}{2}, \quad x \text{ in } \left[-\frac{\pi}{2}, 0\right]$

A) $\cos x = -2, \tan x = \frac{\sqrt{3}}{3}$

B) $\cos x = -\frac{1}{2}, \tan x = -\sqrt{3}$

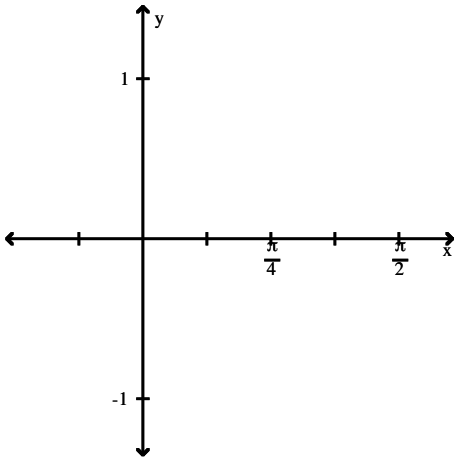
C) $\cos x = \frac{1}{2}, \tan x = \sqrt{3}$

D) $\cos x = \frac{1}{2}, \tan x = -\sqrt{3}$

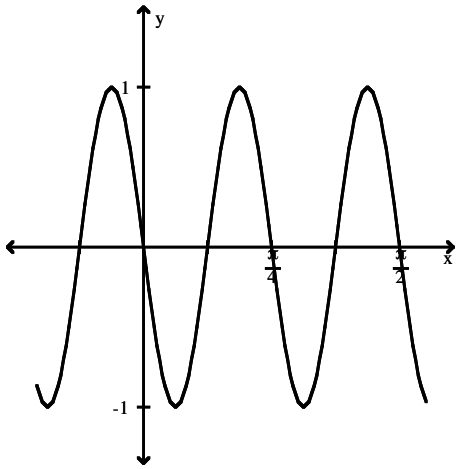
Answer: D

State the period of the function and graph.

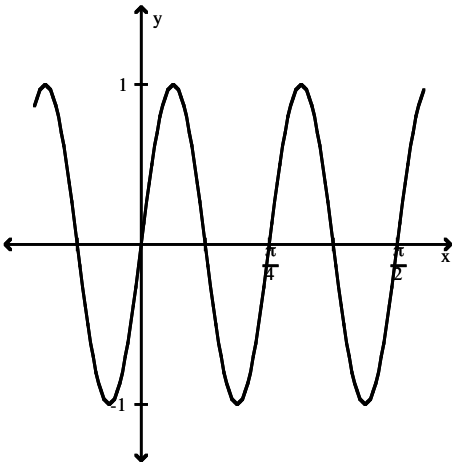
190) $\cos 8x$



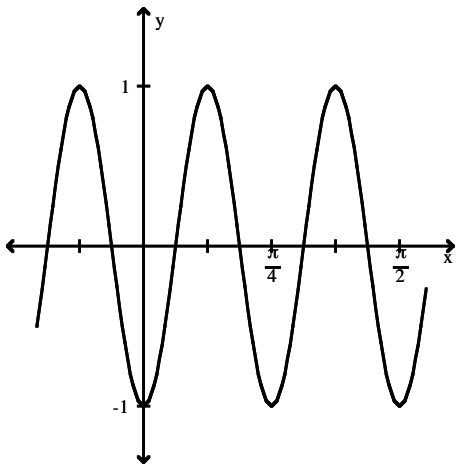
A) Period $\frac{\pi}{4}$



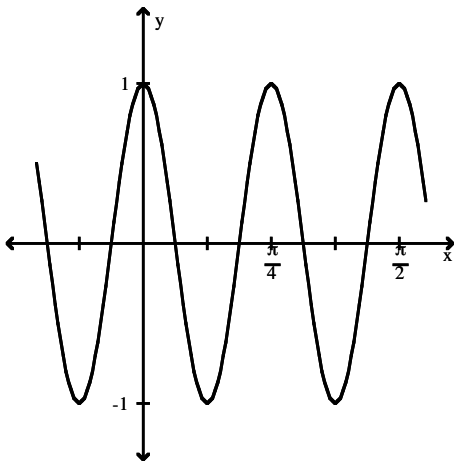
B) Period $\frac{\pi}{4}$



C) Period $\frac{\pi}{4}$

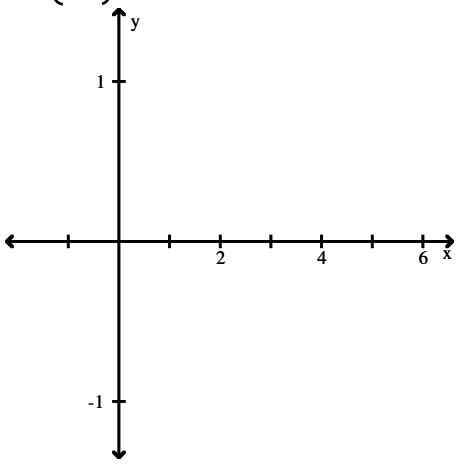


D) Period $\frac{\pi}{4}$

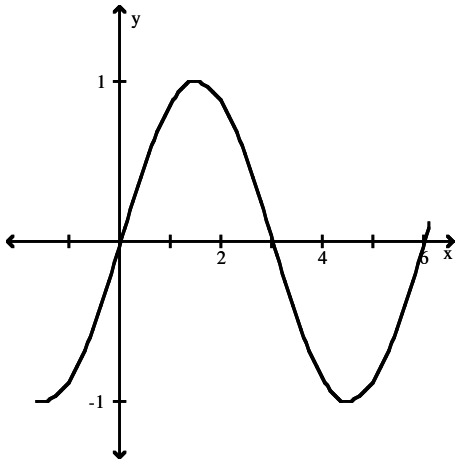


Answer: D

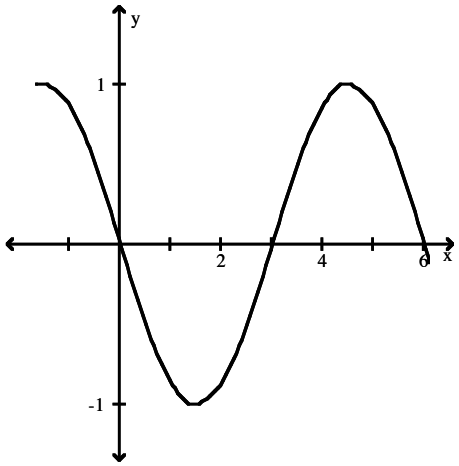
191) $\sin\left(\frac{\pi x}{3}\right)$



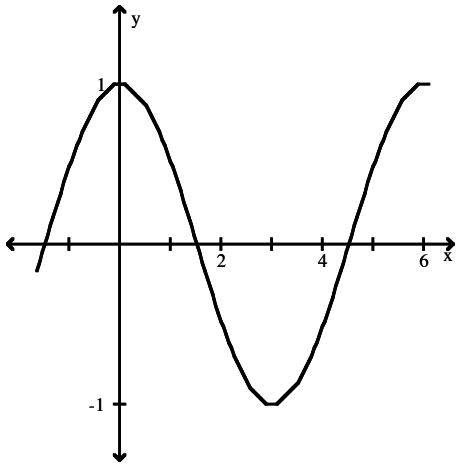
A) Period 6



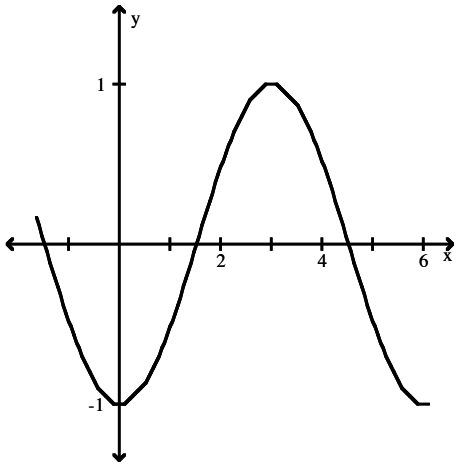
B) Period 6



C) Period 6

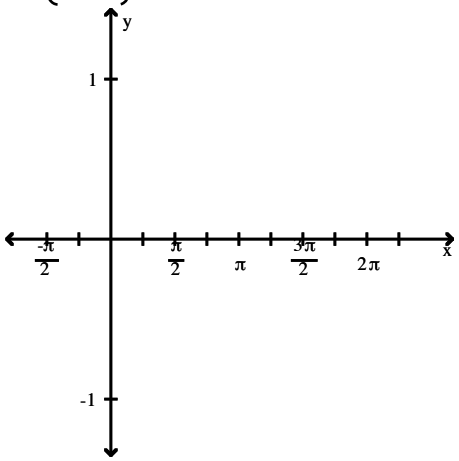


D) Period 6

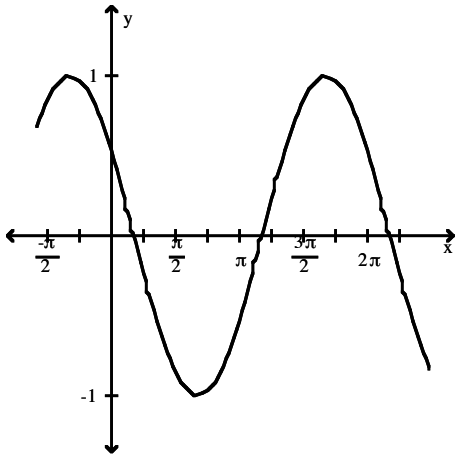


Answer: A

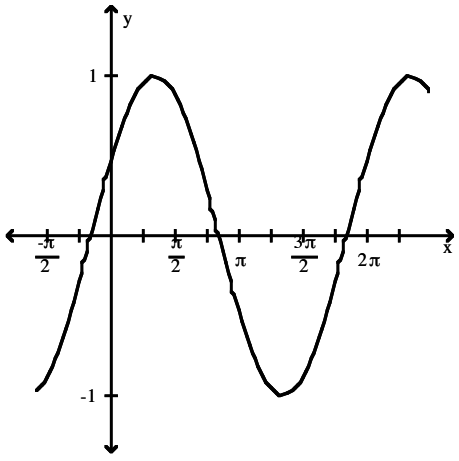
192) $\sin\left(x - \frac{\pi}{3}\right)$



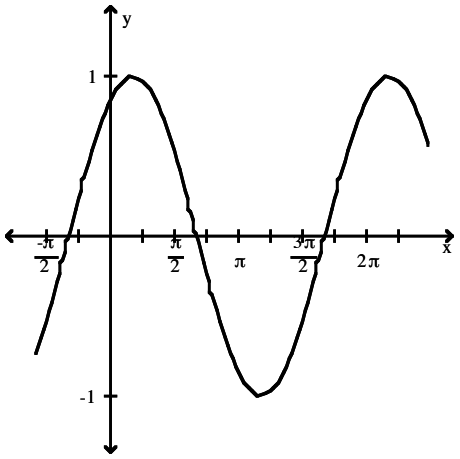
A) Period 2π



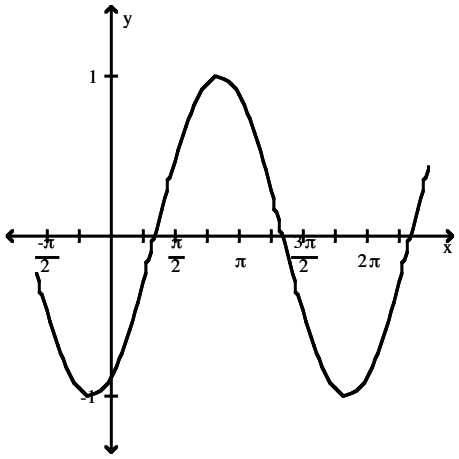
B) Period 2π



C) Period 2π

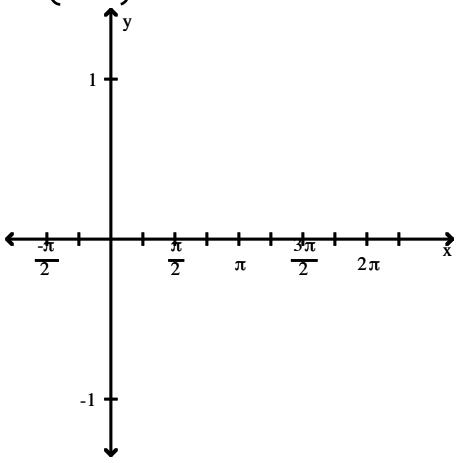


D) Period 2π

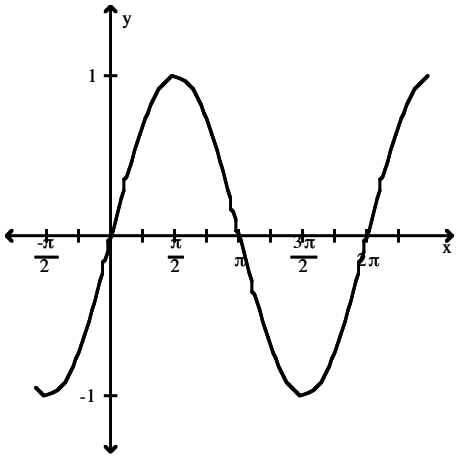


Answer: D

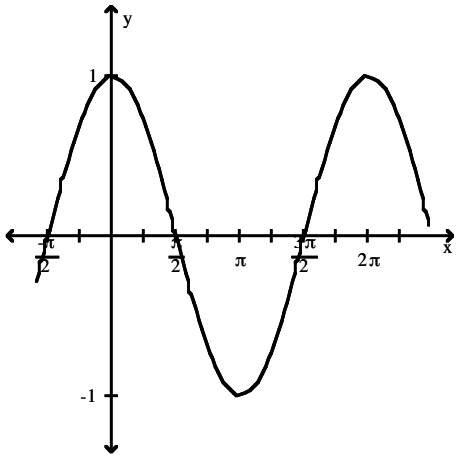
193) $\cos\left(x+\frac{\pi}{2}\right)$



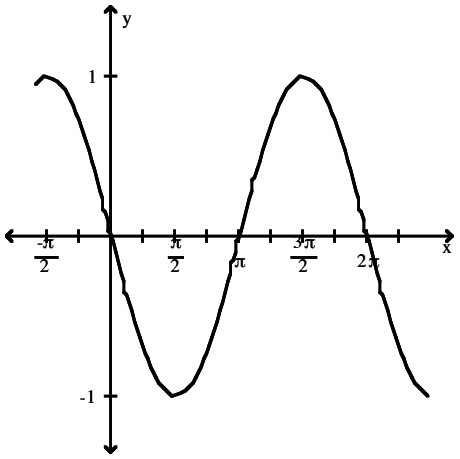
A) Period 2π



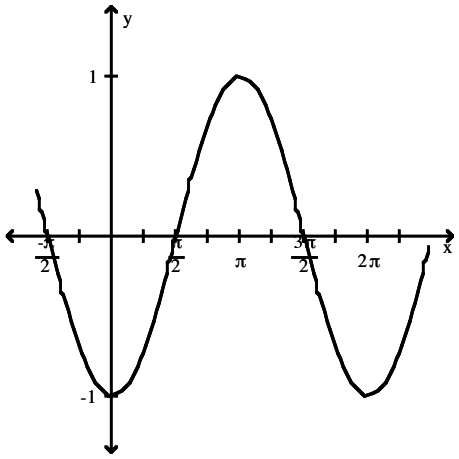
B) Period 2π



C) Period 2π

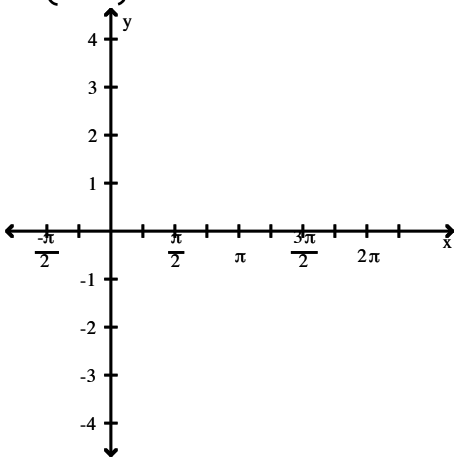


D) Period 2π

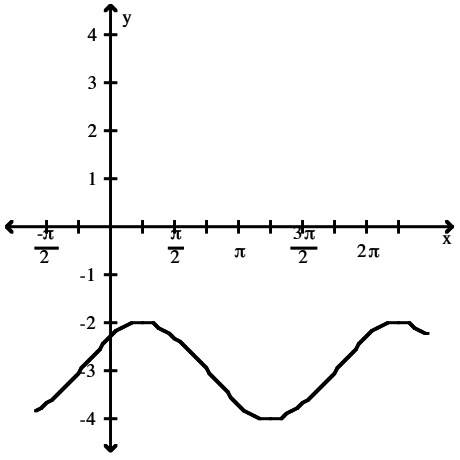


Answer: C

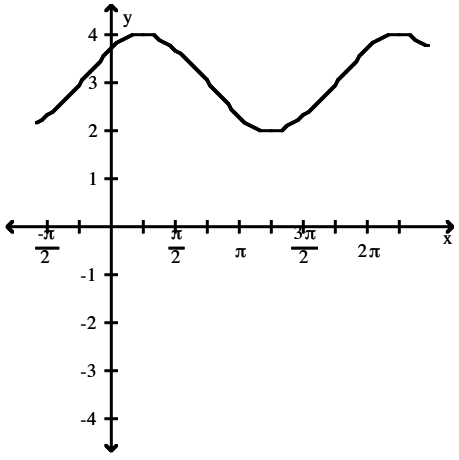
194) $\sin\left(x+\frac{\pi}{4}\right)-3$



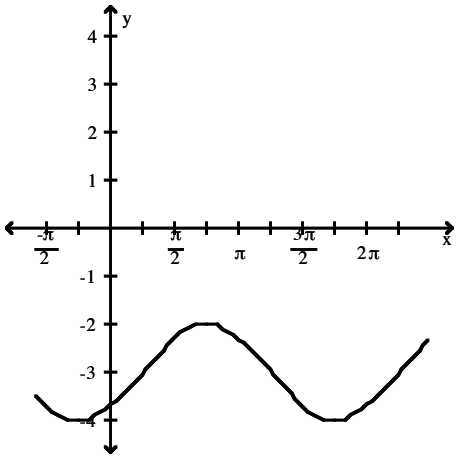
A) Period 2π



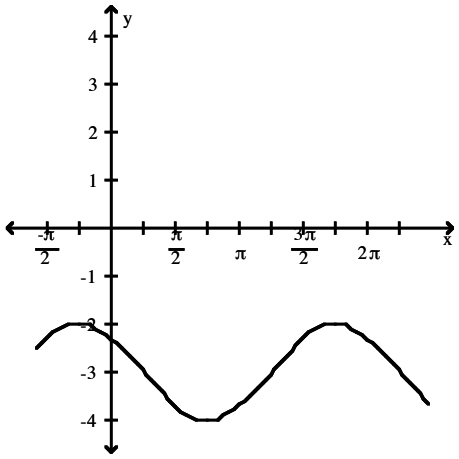
B) Period 2π



C) Period 2π

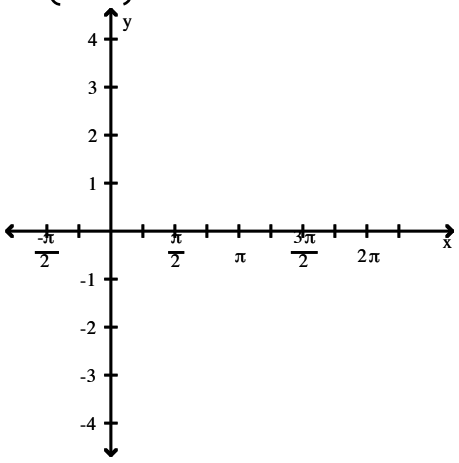


D) Period 2π

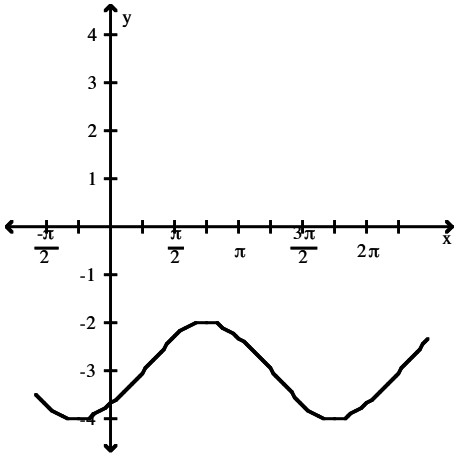


Answer: A

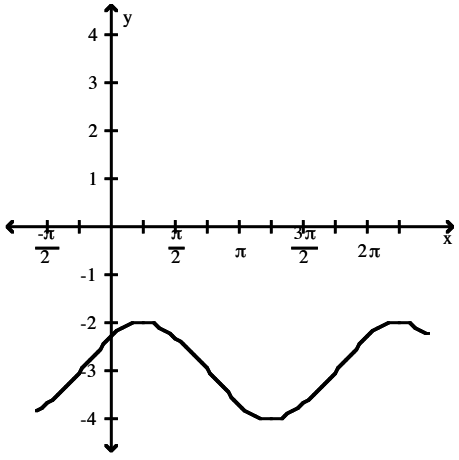
195) $\cos\left(x - \frac{\pi}{4}\right) - 3$



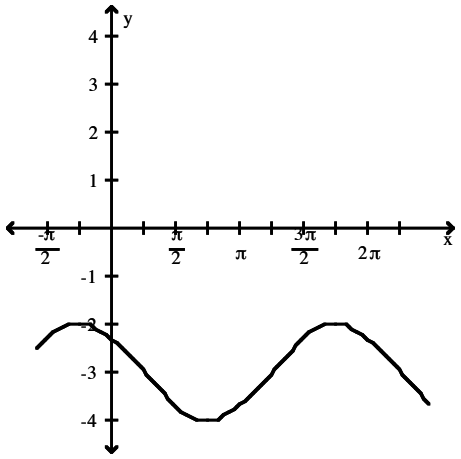
A) Period 2π



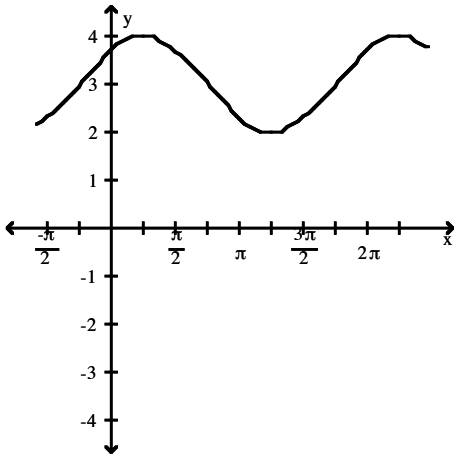
B) Period 2π



C) Period 2π



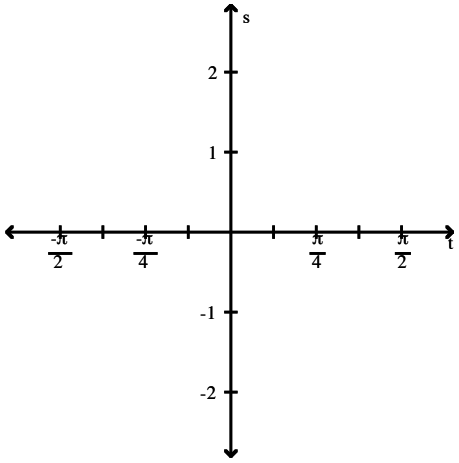
D) Period 2π



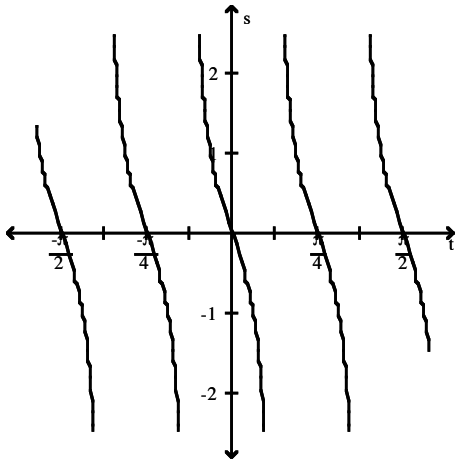
Answer: B

Graph the function in the ts–plane (t–axis horizontal, s–axis vertical). State the period and symmetry of the function.

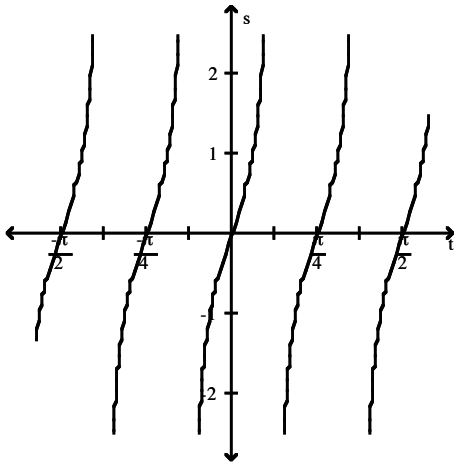
196) $s = -\tan 4t$



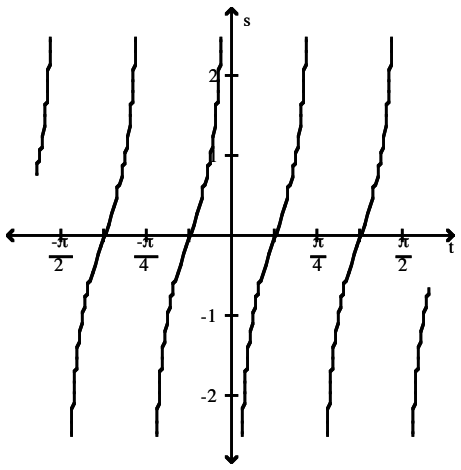
A) Period $\frac{\pi}{4}$, symmetric about the origin



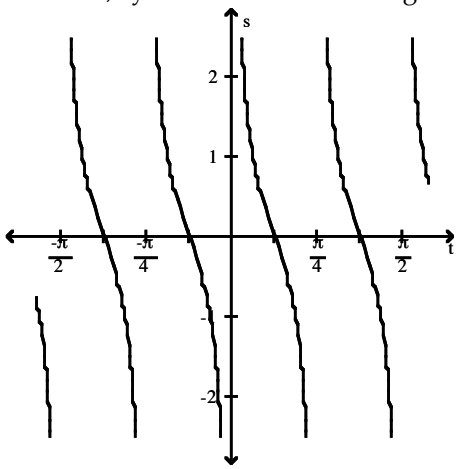
B) Period $\frac{\pi}{4}$, symmetric about the s–axis



C) Period $\frac{\pi}{4}$, symmetric about the origin

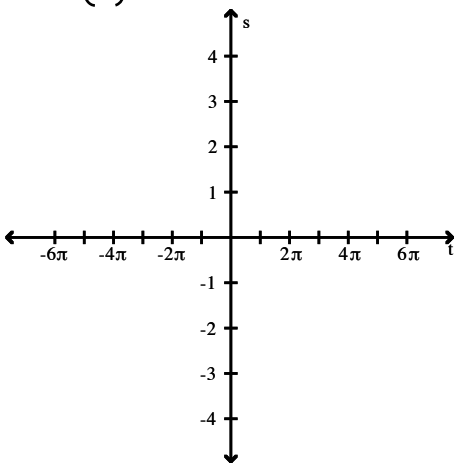


D) Period π, symmetric about the origin

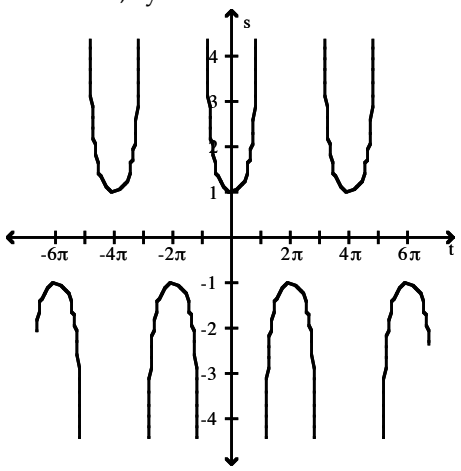


Answer: A

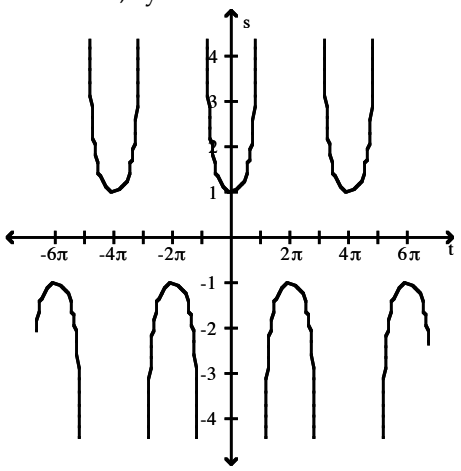
197) $s = \sec\left(\frac{t}{2}\right)$



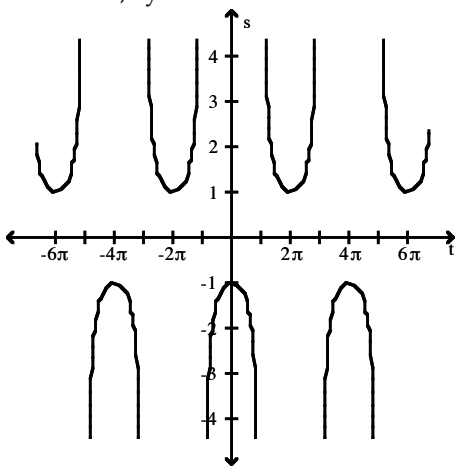
A) Period 4π, symmetric about the t–axis



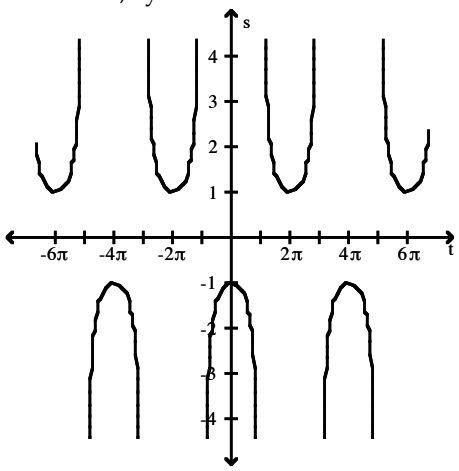
B) Period 4π, symmetric about the s–axis



C) Period 4π, symmetric about the t–axis

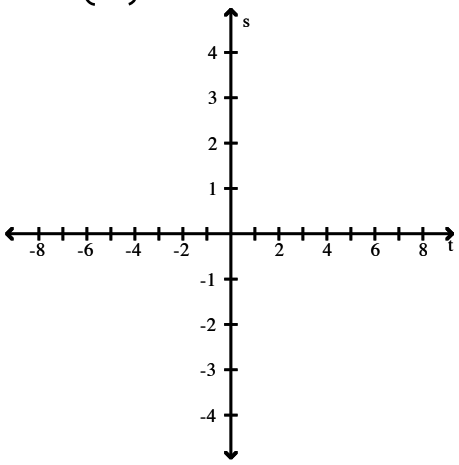


D) Period 4π, symmetric about the s–axis

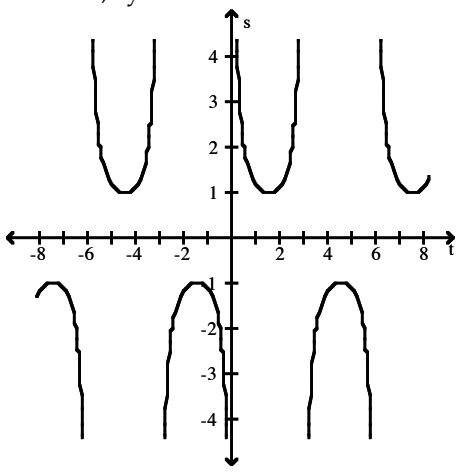


Answer: B

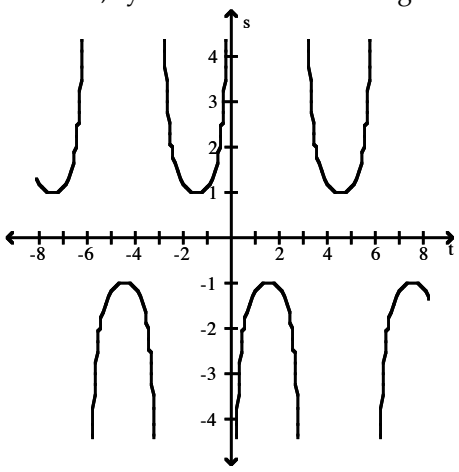
198) $s = \csc\left(\frac{\pi t}{3}\right)$



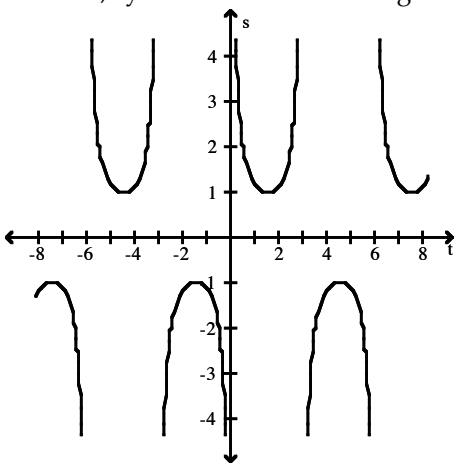
A) Period 6, symmetric about the s–axis



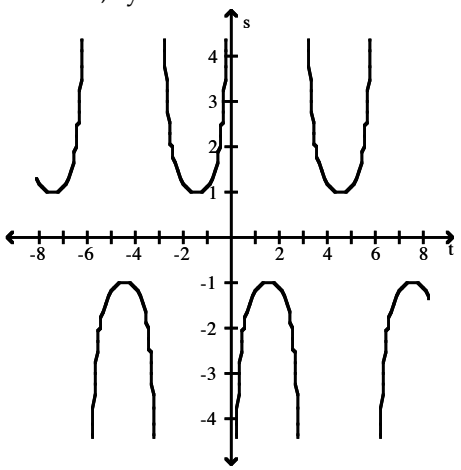
B) Period 6, symmetric about the origin



C) Period 6, symmetric about the origin



D) Period 6, symmetric about the s–axis



Answer: C

Use the addition formulas to derive the identity.

199) $\cos\left(x - \frac{\pi}{2}\right) = \sin x$

Answer: $\cos\left(x - \frac{\pi}{2}\right) = \cos x \cos\left(-\frac{\pi}{2}\right) - \sin x \sin\left(-\frac{\pi}{2}\right)$

$= \cos x\,(0) - \sin x\,(-1)$

$= 0 + \sin x$

$= \sin x$

200) $\cos\left(x + \frac{\pi}{2}\right) = -\sin x$

Answer: $\cos\left(x + \frac{\pi}{2}\right) = \cos x \cos\frac{\pi}{2} - \sin x \sin\frac{\pi}{2}$

$= \cos x\,(0) - \sin x\,(1)$

$= 0 - \sin x$

$= -\sin x$

201) $\sin\left(x + \frac{\pi}{2}\right) = \cos x$

Answer: $\sin\left(x + \frac{\pi}{2}\right) = \sin x \cos\frac{\pi}{2} + \cos x \sin\frac{\pi}{2}$

$= \sin x\,(0) + \cos x\,(1)$

$= 0 + \cos x$

$= \cos x$

202) $\sin\left(x - \frac{\pi}{2}\right) = -\cos x$

Answer: $\sin\left(x - \frac{\pi}{2}\right) = \sin x \cos\left(-\frac{\pi}{2}\right) + \cos x \sin\left(-\frac{\pi}{2}\right)$

$= \sin x\,(0) + \cos x\,(-1)$

$= 0 - \cos x$

$= -\cos x$

Express the given quantity in terms of sin x or cos x.

203) $\cos(6\pi + x)$

A) $-\cos x$ B) $-\sin x$ C) $\cos x$ D) $\cos x - \sin x$

Answer: C

204) $\cos(3\pi + x)$

A) $\cos x$ B) $-\sin x$ C) $\sin x - \cos x$ D) $-\cos x$

Answer: D

205) $\sin(3\pi + x)$

A) $\cos x - \sin x$ B) $-\sin x$ C) $\sin x$ D) $\cos x + \sin x$

Answer: B

206) $\sin(6\pi + x)$

A) $\cos x - \sin x$ B) $\cos x + \sin x$ C) $-\sin x$ D) $\sin x$

Answer: D

207) $\cos\left(\frac{7\pi}{2} + x\right)$

A) $\cos x + \sin x$ B) $\cos x$ C) $-\sin x$ D) $\sin x$

Answer: D

208) $\sin\left(\frac{3\pi}{2} + x\right)$

A) $\sin x - \cos x$ B) $-\cos x$ C) $\cos x$ D) $-\cos x - \sin x$

Answer: B

209) $\sin(6\pi - x)$

A) $\cos x - \sin x$ B) $\sin x$ C) $\sin(-x)$ D) $-\sin x$

Answer: D

210) $\cos(6\pi - x)$

A) $-\cos x$ B) $\cos x - \sin x$ C) $\cos x + \sin x$ D) $\cos x$

Answer: D

211) $\sin\left(\frac{3\pi}{2} - x\right)$

A) $\cos x$ B) $-\cos x$ C) $-\cos(-x)$ D) $-\cos x - \sin x$

Answer: B

212) $\cos\left(\frac{7\pi}{2} - x\right)$

A) $\cos x + \sin x$ B) $-\sin x$ C) $\sin x$ D) $\sin(-x)$

Answer: B

Use the appropriate addition formula to find the exact value of the expression.

213) $\sin\left(\frac{11\pi}{12}\right)$

A) $\frac{\sqrt{6}+\sqrt{2}}{4}$ B) $-\frac{\sqrt{6}+\sqrt{2}}{4}$ C) $\frac{\sqrt{2}-\sqrt{6}}{4}$ D) $\frac{\sqrt{6}-\sqrt{2}}{4}$

Answer: D

214) $\sin\left(-\frac{11\pi}{12}\right)$

A) $\frac{\sqrt{6}-\sqrt{2}}{4}$ B) $\frac{\sqrt{6}+\sqrt{2}}{4}$ C) $\frac{\sqrt{2}-\sqrt{6}}{4}$ D) $-\frac{\sqrt{6}+\sqrt{2}}{4}$

Answer: C

215) $\cos\left(\frac{\pi}{12}\right)$

A) $\frac{\sqrt{2}-\sqrt{6}}{4}$ B) $-\frac{\sqrt{6}+\sqrt{2}}{4}$ C) $\frac{\sqrt{6}+\sqrt{2}}{4}$ D) $\frac{\sqrt{6}-\sqrt{2}}{4}$

Answer: C

216) $\cos\left(-\frac{7\pi}{12}\right)$

A) $\frac{\sqrt{6}-\sqrt{2}}{4}$ B) $\sqrt{2}-\sqrt{6}$ C) $\frac{\sqrt{2}-\sqrt{6}}{4}$ D) $\sqrt{6}+\sqrt{2}$

Answer: C

217) $\tan\left(\frac{7\pi}{12}\right)$

A) $\frac{2-\sqrt{3}}{4}$ B) $-2-\sqrt{3}$ C) $\frac{2+\sqrt{3}}{4}$ D) $2+\sqrt{3}$

Answer: B

218) $\tan\left(-\frac{7\pi}{12}\right)$

A) $\frac{2-\sqrt{3}}{4}$ B) $2+\sqrt{3}$ C) $-2-\sqrt{3}$ D) $\frac{2+\sqrt{3}}{4}$

Answer: B

219) $\tan\left(\frac{13\pi}{12}\right)$

A) $\frac{2-\sqrt{3}}{4}$ B) $\frac{2+\sqrt{3}}{4}$ C) $2-\sqrt{3}$ D) $2+\sqrt{3}$

Answer: C

220) $\sin\left(\frac{17\pi}{12}\right)$

A) $\frac{\sqrt{2}-\sqrt{6}}{4}$ B) $-\frac{\sqrt{6}+\sqrt{2}}{4}$ C) $\frac{\sqrt{6}-\sqrt{2}}{4}$ D) $\frac{\sqrt{6}+\sqrt{2}}{4}$

Answer: B

221) $\cos\left(\frac{19\pi}{12}\right)$

A) $-\sqrt{6}-\sqrt{2}$ B) $\sqrt{2}-\sqrt{6}$ C) $\frac{\sqrt{6}-\sqrt{2}}{4}$ D) $\frac{\sqrt{2}-\sqrt{6}}{4}$

Answer: C

222) $\sin\left(\frac{19\pi}{12}\right)$

A) $\frac{\sqrt{6}+\sqrt{2}}{4}$ B) $-\frac{\sqrt{6}+\sqrt{2}}{4}$ C) $\frac{\sqrt{6}-\sqrt{2}}{4}$ D) $\frac{\sqrt{2}-\sqrt{6}}{4}$

Answer: B

Find the function value.

223) $\cos^2\frac{\pi}{8}$

A) $\frac{2+\sqrt{2}}{4}$ B) $2+\sqrt{2}$ C) $\frac{1+\sqrt{2}}{2}$ D) $\frac{2-\sqrt{2}}{4}$

Answer: A

224) $\sin^2\frac{\pi}{6}$

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

Answer: B

Solve for the angle θ, where $0 \le \theta \le 2\pi$

225) $\sin^2\theta = \frac{1}{4}$

A) $\theta = \frac{\pi}{3}, \frac{2\pi}{3}, \frac{4\pi}{3}, \frac{5\pi}{3}$

B) $\theta = \frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4}$

C) $\theta = 0, \pi, 2\pi$

D) $\theta = \frac{\pi}{6}, \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{11\pi}{6}$

Answer: D

226) $\sin^2\theta = \frac{3}{4}$

A) $\theta = \frac{\pi}{6}, \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{11\pi}{6}$

B) $\theta = 0, \pi, 2\pi$

C) $\theta = \frac{\pi}{3}, \frac{2\pi}{3}, \frac{4\pi}{3}, \frac{5\pi}{3}$

D) $\theta = \frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4}$

Answer: C

227) $\cos^2\theta = \frac{1}{4}$

A) $\theta = \frac{\pi}{6}, \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{11\pi}{6}$

B) $\theta = 0, \pi, 2\pi$

C) $\theta = \frac{\pi}{3}, \frac{2\pi}{3}, \frac{4\pi}{3}, \frac{5\pi}{3}$

D) $\theta = \frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4}$

Answer: C

228) $\cos^2\theta = \frac{3}{4}$

A) $\theta = 0, \pi, 2\pi$

B) $\theta = \frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4}$

C) $\theta = \frac{\pi}{3}, \frac{2\pi}{3}, \frac{4\pi}{3}, \frac{5\pi}{3}$

D) $\theta = \frac{\pi}{6}, \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{11\pi}{6}$

Answer: D

229) $\sin 2\theta - \cos\theta = 0$

A) $\frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{6}, \frac{11\pi}{6}$

B) $\theta = \frac{\pi}{6}, \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{11\pi}{6}$

C) $0, \frac{\pi}{2}, \pi, \frac{3\pi}{2}, 2\pi$

D) $\theta = \frac{\pi}{2}, \frac{3\pi}{2}, \frac{\pi}{6}, \frac{5\pi}{6}$

Answer: D

230) $\sin 2\theta + \cos\theta = 0$

A) $\frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{6}, \frac{11\pi}{6}$

B) $\theta = \frac{\pi}{2}, \frac{3\pi}{2}, \frac{\pi}{6}, \frac{5\pi}{6}$

C) $\theta = \frac{\pi}{6}, \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{11\pi}{6}$

D) $\theta = \frac{\pi}{2}, \frac{3\pi}{2}, \frac{7\pi}{6}, \frac{11\pi}{6}$

Answer: D

Find the requested information using the law of cosines and/or the law of sines. Round to three decimal places.

231) A triangle has sides $a = 4$ and $b = 2$ and angle $C = 50°$. Find the length of side c.

A) 9.715 B) 3.117 C) 2.783 D) 3.855

Answer: B

232) A triangle has sides $a = 3$ and $b = 4$ and angle $C = 30°$. Find the sine of B.

A) 0.974 B) 0.244 C) 0.731 D) 0.061

Answer: A

233) A triangle has side $c = 4$ and angles $A = \frac{\pi}{4}$ and $B = \frac{\pi}{6}$. Find the length b of the side opposite B.

A) 2.928 B) 2.071 C) 0.518 D) 0.129

Answer: B

For

$$\mathbf{f(x) = A \sin\left(\frac{2\pi}{B}(x - C)\right) + D,}$$

identify either A, B, C, or D as indicated for the sine function.

234) $y = 2\cos(\theta - 2\pi)$ Find A.

A) 1 B) 2π C) 4 D) 2

Answer: D

235) $y = 2\cos(\theta + \pi)$ Find B.

A) 2π B) π C) 2 D) 4

Answer: A

236) $y = -\cos(-5\theta - \pi)$ Find C.

A) $\frac{\pi}{8}$ B) $\frac{4}{5}\pi$ C) $-\frac{\pi}{8}$ D) $-\frac{1}{5}\pi$

Answer: D

237) $y = 2 - 2\cos\left(\frac{1}{2}\theta - 2\pi\right)$ Find D.

A) 2 B) 1 C) π D) –2

Answer: A

238) $y = 3\cos\left(2x + \frac{\pi}{3}\right)$ Find A.

A) 3 B) 6 C) $\frac{\pi}{2}$ D) 2

Answer: A

239) $y = -4\sin\left(2x + \frac{\pi}{4}\right)$ Find A.

A) $\frac{\pi}{4}$ B) –8 C) –4 D) 2

Answer: C

240) $y = 2\sin\left(4x + \frac{\pi}{2}\right)$ Find B.

A) 4 B) $\frac{\pi}{2}$ C) 2 D) π

Answer: B

241) $y = -5\cos\left(3x + \frac{\pi}{2}\right)$ Find B.

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

Answer: B

Solve the problem.

242) Use the angle sum formulas to derive $\sin(A - B) = \sin A \cos B - \cos A \sin B$.

Answer: $\sin(A - B)$
$= \sin(A + (-B))$
$= \sin A \cos(-B) + \cos A \sin(-B)$
$= \sin A \cos B - \cos A \sin B$

243) The standard formula for the tangent of the difference of two angles is $\tan(A - B) = \frac{\tan A - \tan B}{1 + \tan A \tan B}$. Derive the formula.

Answer: $\tan(A - B) = \frac{\sin(A - B)}{\cos(A - B)} = \frac{\sin A \cos B - \sin B \cos A}{\cos A \cos B + \sin A \sin B} =$

$$\frac{(\cos A \cos B)^{-1}(\sin A \cos B - \sin B \cos A)}{(\cos A \cos B)^{-1}(\cos A \cos B + \sin A \sin B)} = \frac{\tan A - \tan B}{1 + \tan A \tan B}.$$

244) Graph $y = \cos 2x$ and $y = \sec 2x$ together for $-\frac{3\pi}{4} \le x \le \frac{3\pi}{4}$. Comment on the behavior of sec 2x in relation to the signs and values of cos 2x.

Answer: When $y = \cos 2x$ is at a maximum point, which is at any mulitple of π, $y = \sec 2x$ is a minimum point. Similarly, when cos (2x) is at a minimum point, which is at any odd multiple of $\frac{\pi}{2}$, $y = \sec 2x$ is a at maximum point.

245) Graph $y = \sin\frac{x}{2}$ and $y = \csc\frac{x}{2}$ together for $-2\pi \le x \le 2\pi$. Comment on the behavior of $\csc\frac{x}{2}$ in relation to the signs and values of $\sin\frac{x}{2}$.

Answer: When $y = \sin\frac{x}{2}$ is at a maximum point, which is at $x = (4n + 1)\pi$ for all integers n, $y = \csc\frac{x}{2}$ is at a minimum point. Similarly, when $y = \sin\frac{x}{2}$ is at minimum point, , which is at $x = (4n - 1)\pi$ for all integers n, $y = \csc\frac{x}{2}$ is at a maximum point.

246) What happens if you set $B = -2\pi$ in the angle sum formulas for the sine and cosine functions? Do the results agree with something you already know?

Answer: If $B = -2\pi$, then $\cos(A + B) = \cos A$ and $\sin(A + B) = \sin A$. Because the period of both of the sine and cosine functions is 2π, if B is replaced by a multiple of 2π the angle sum formulas must produce the same value as the sine or cosine function.

Use a graphing calculator or computer to determine which of the given viewing windows displays the most appropriate graph of the specified function.

247) $f(x) = x^4 - 8x^2 + 6x$

A) [–25, 15] by [–5, 5]
B) [–5, 5] by [–10, 15]
C) [–5, 5] by [–25, 15]
D) [–10, 15] by [–5, 5]

Answer: C

248) $f(x) = x^3 - 2x^2 - 3x + 19$

A) [–20, 20] by [–100, 100]
B) [–5, 25] by [–5, 5]
C) [–2, 2] by [–10, 10]
D) [–5, 5] by [–5, 25]

Answer: D

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

A) [–10, 10] by [–10, 5]
B) [–10, 20] by [–50, 50]
C) [–4, 5] by [–5, 5]
D) [–4, 5] by [–15, 25]

Answer: D

250) $f(x) = \sqrt{7 + 6x - x^2}$

A) [–10, 20] by [–50, 50]
B) [–4, 5] by [–5, 5]
C) [–4, 5] by [–15, 25]
D) [–10, 10] by [–10, 5]

Answer: C

251) $f(x) = x^{2/3}(7 - x)$

A) [0, 10] by [–10, 10]
B) [–4, 0] by [–5, 5]
C) [–4, 10] by [–10, 10]
D) [–2, 2] by [–15, 15]

Answer: C

252) $f(x) = |x^2 - 7|$

A) [–5, 5] by [–2, 10]
B) [–5, 5] by [–15, 15]
C) [0, 5] by [–2, 10]
D) [–10, 10] by [–15, 15]

Answer: A

253) $f(x) = \dfrac{x^2 - 8}{x^2 + 8}$

A) [–1, 1] by [–2, 2]
B) [–10, 10] by [–2, 2]
C) [–10, 10] by [–10, 10]
D) [–5, 5] by [–15, 15]

Answer: B

254) $f(x) = \dfrac{10}{x^2 - 7}$

A) [–2, 2] by [–10, 10]
B) [–5, 5] by [–10, 10]
C) [–5, 0] by [–10, 10]
D) [0, 5] by [–10, 10]

Answer: B

255) $f(x) = 3 \cos 70x$

A) [–0.2, 0.2] by [–4, 4]
B) [–1, 1] by [–4, 4]
C) [–0.2, 0.2] by [–1, 1]
D) [–10, 10] by [–10, 10]

Answer: A

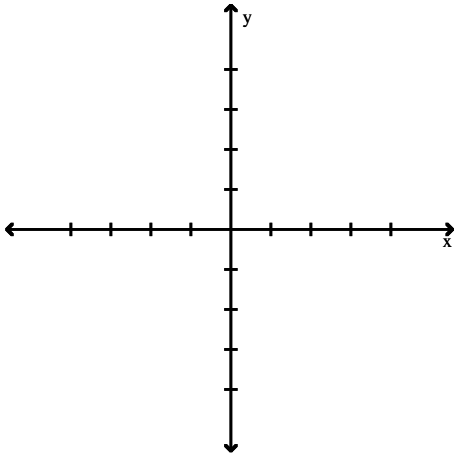
256) $f(x) = x^2 + \dfrac{1}{20} \cos 60x$

A) [–0.6, 0.6] by [–0.1, 0.6]
B) [–0.1, 0.1] by [–0.1, 0.1]
C) [–10, 10] by [–10, 10]
D) [–2, 2] by [–1, 1]

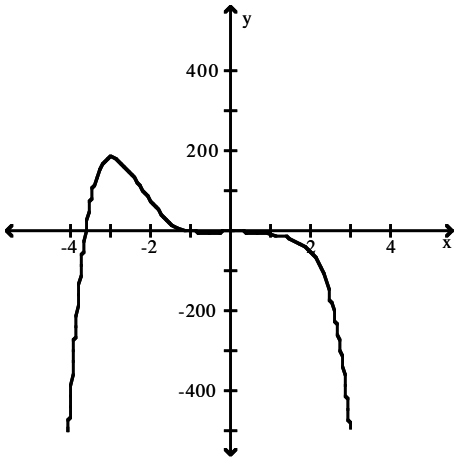
Answer: A

Determine an appropriate viewing window for the given function and use it to display its graph.

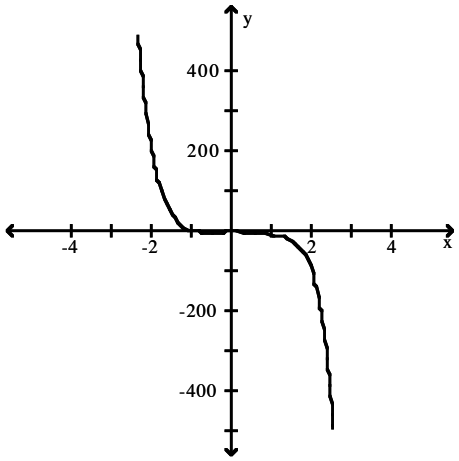
257) $f(x) = -0.7x^6 - x^5 + 5x^4 - 4x^3 - 6x^2 + x - 3$



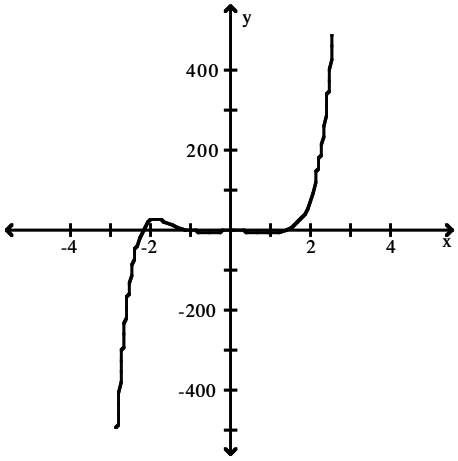
A)



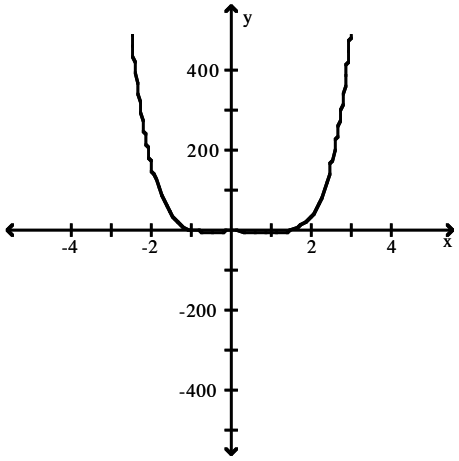
B)



C)

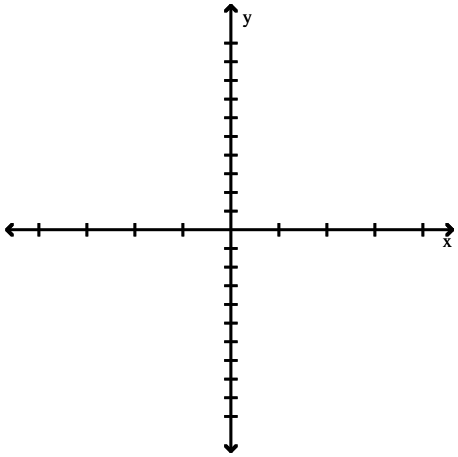


D)

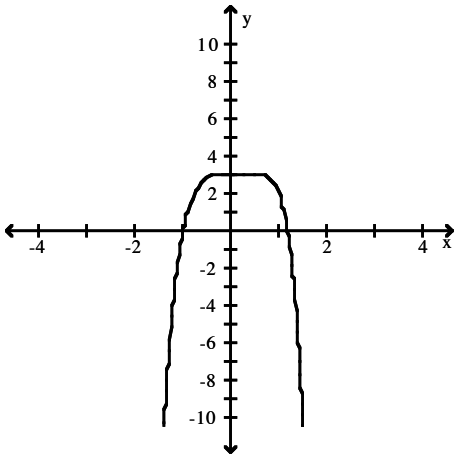


Answer: A

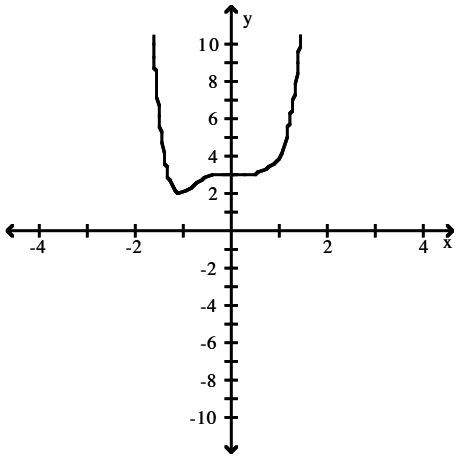
258) $f(x) = x^5 - x^4 + x^3 + 3$



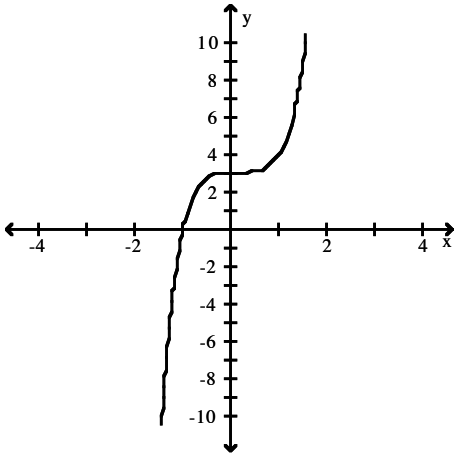
A)



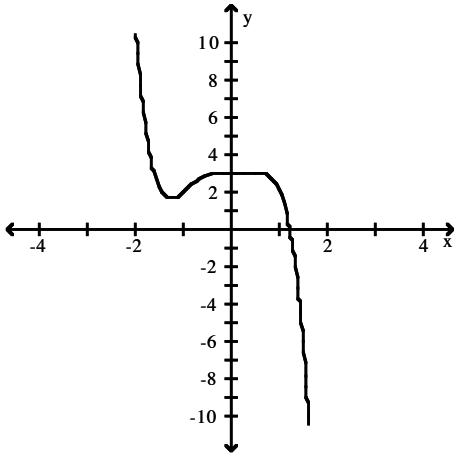
B)



C)

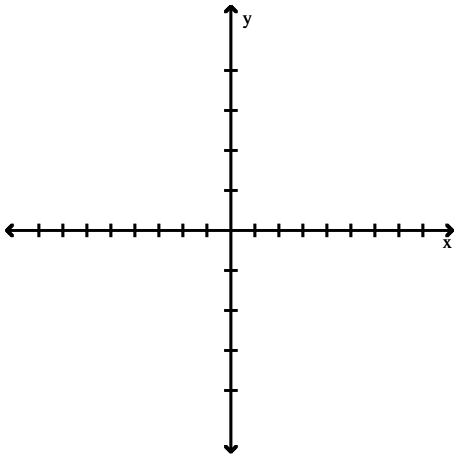


D)

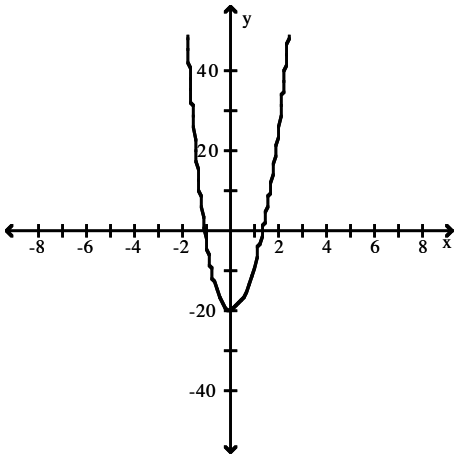


Answer: C

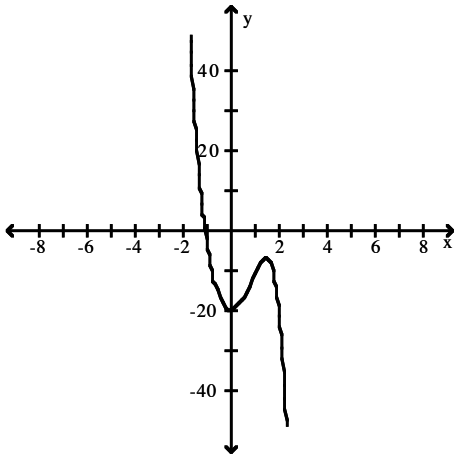
259) $f(x) = x^4 - 3x^3 + 13x^2 + x - 20$



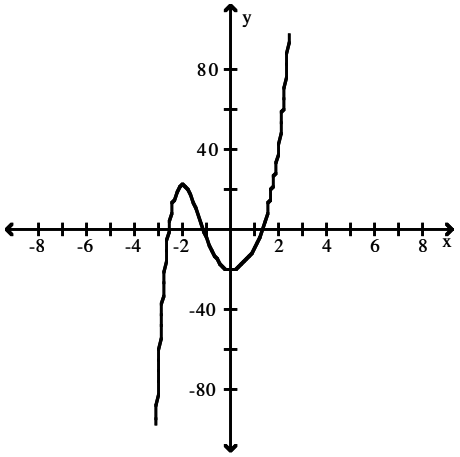
A)



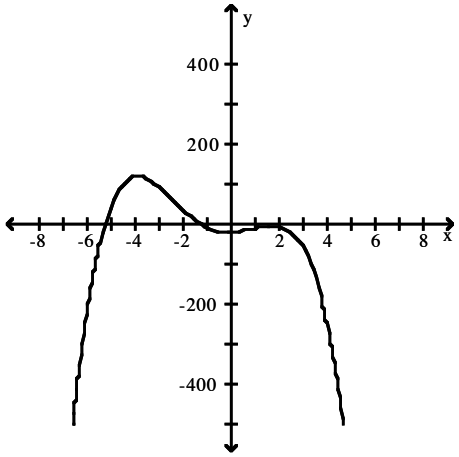
B)



C)

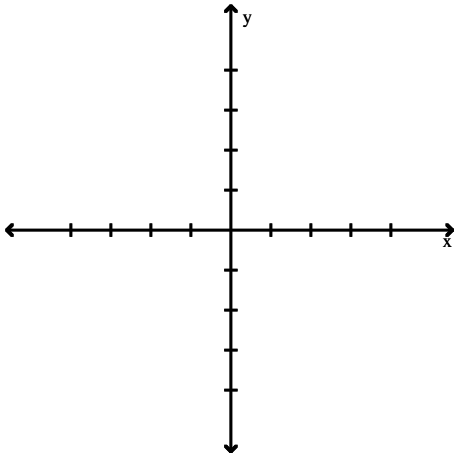


D)

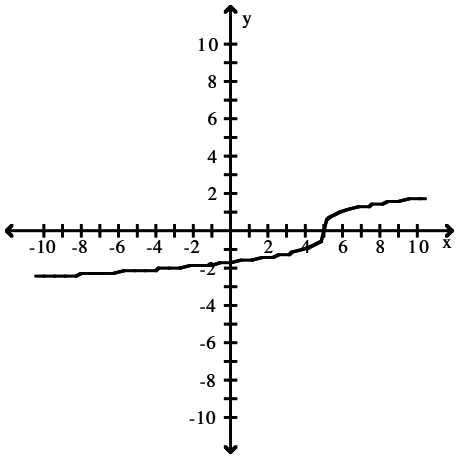


Answer: A

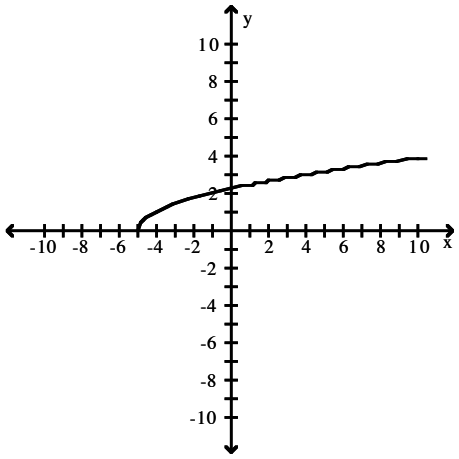
260) $f(x) = \sqrt[3]{x-5}$



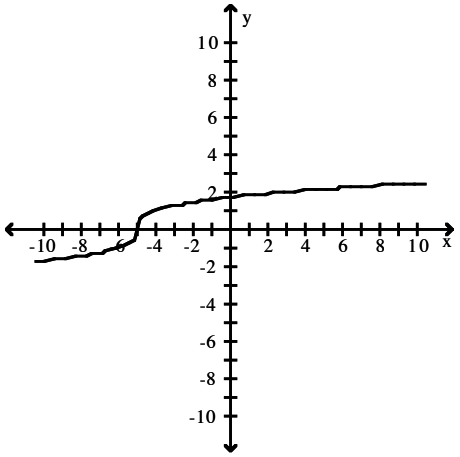
A)



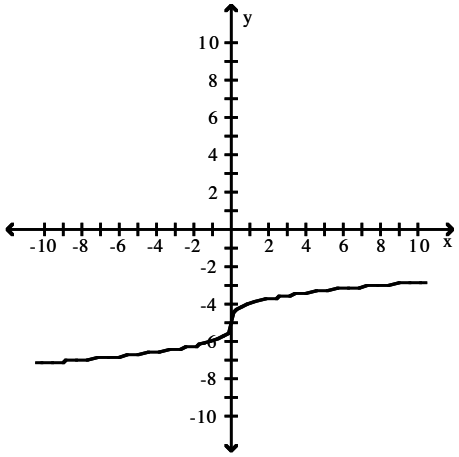
B)



C)

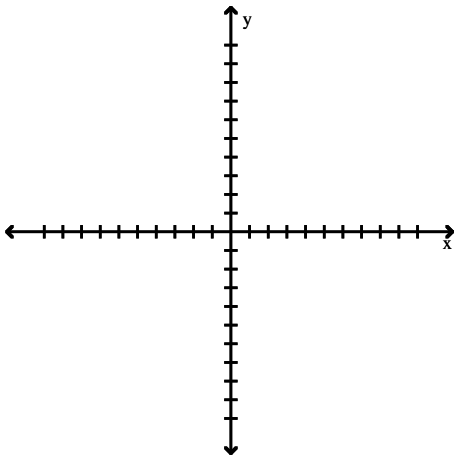


D)

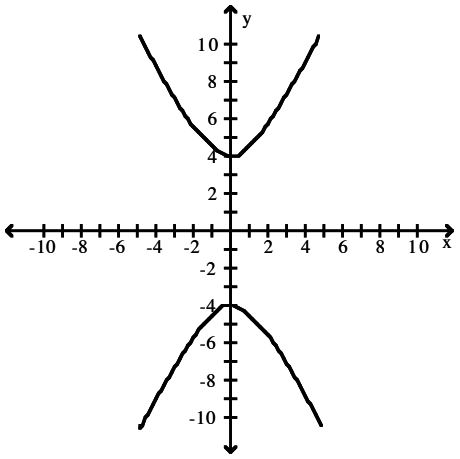


Answer: A

261) $y = 4\sqrt{\frac{16+x^2}{16}}$



A)



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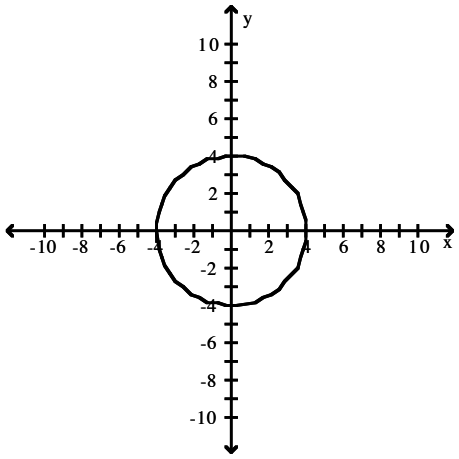
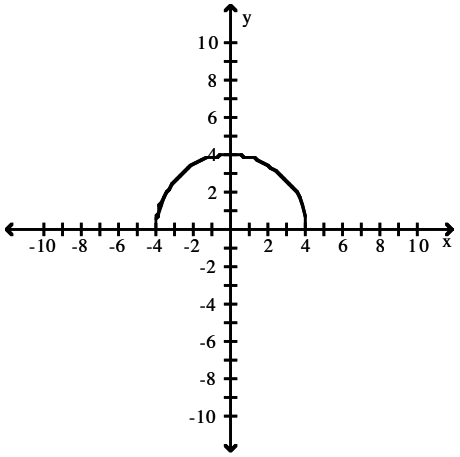
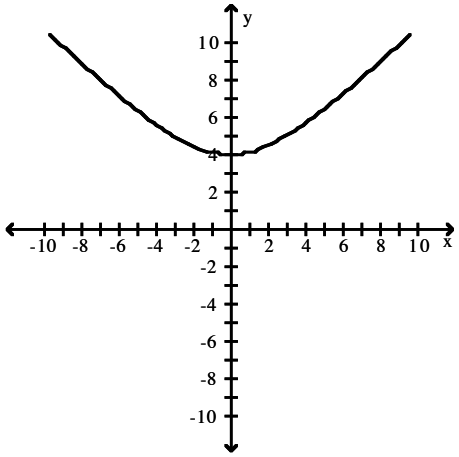


C)

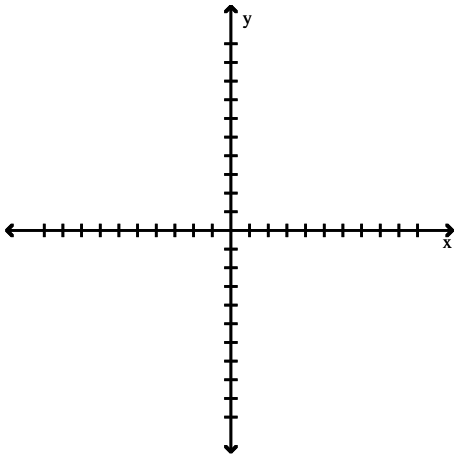


D)

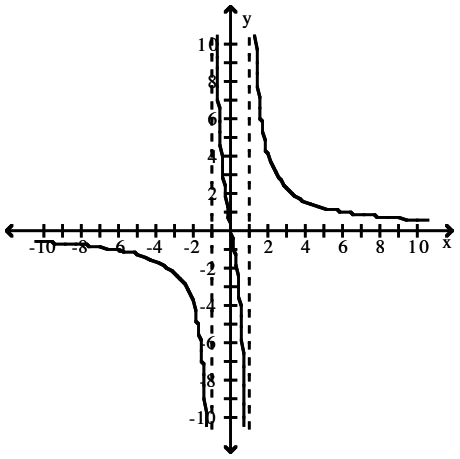


Answer: D

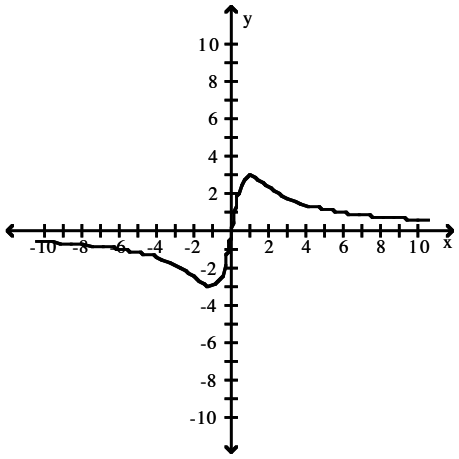
262) $f(x) = \dfrac{6x}{x^2 - 1}$



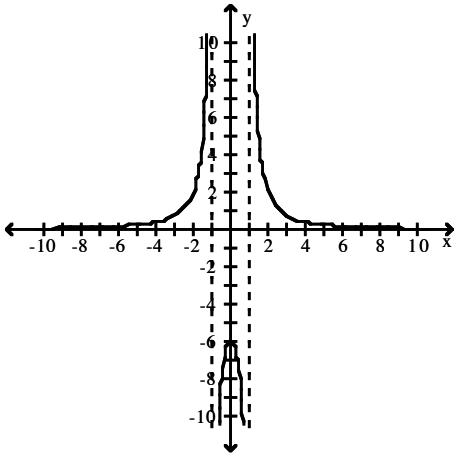
A)



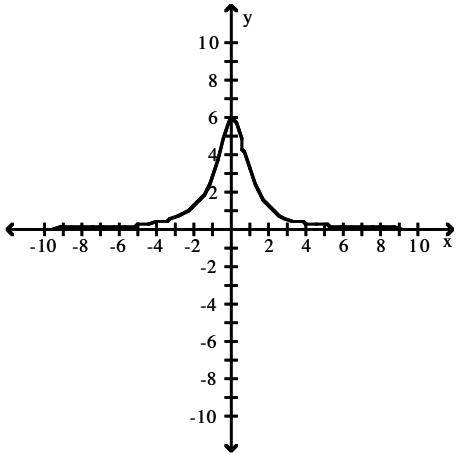
B)



C)

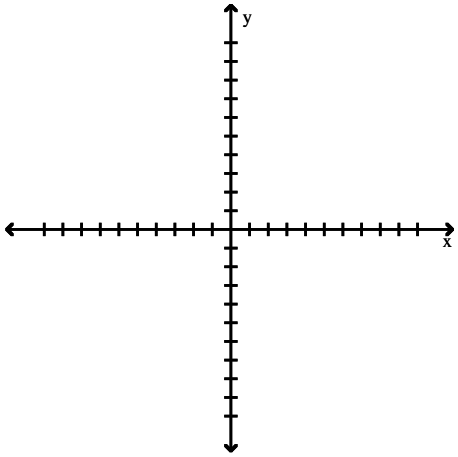


D)

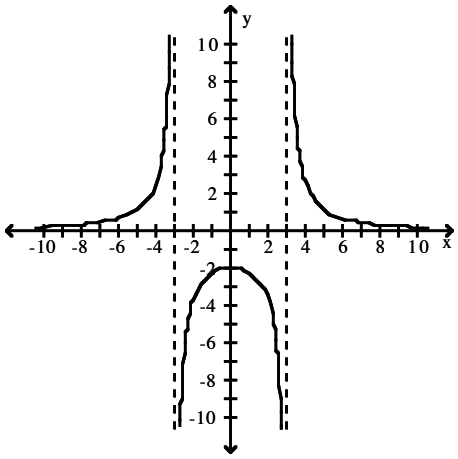


Answer: A

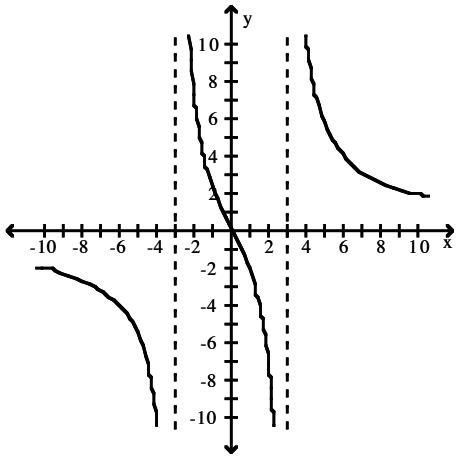
263) $f(x) = \dfrac{3x^2}{x^2 - 9}$



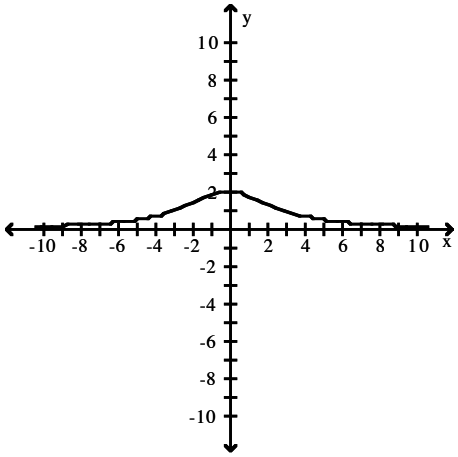
A)



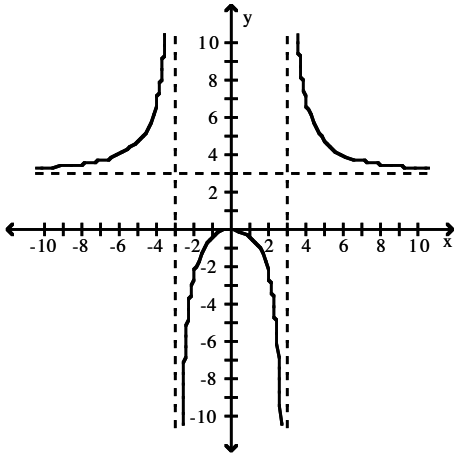
B)



C)

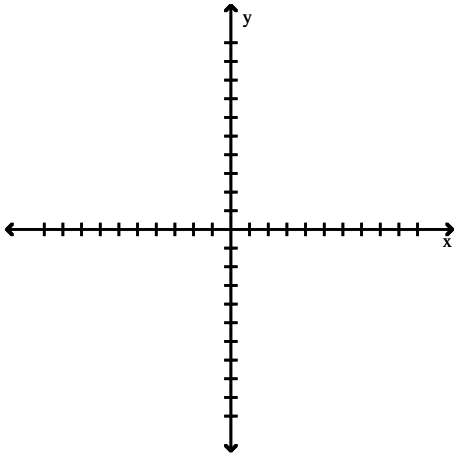


D)

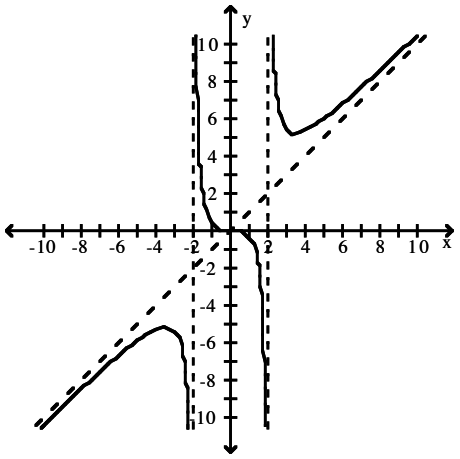


Answer: D

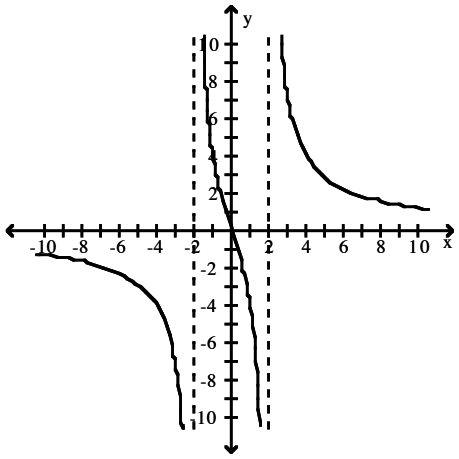
264) $f(x) = \dfrac{x^3}{x^2 - 4}$



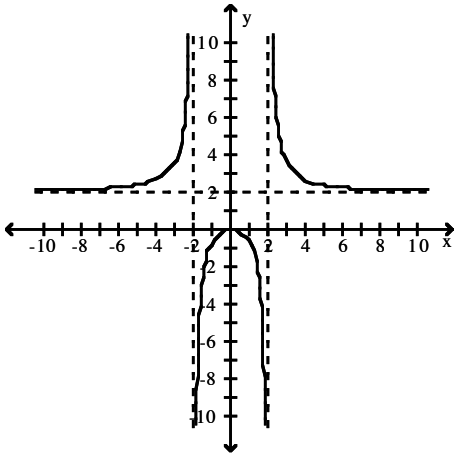
A)



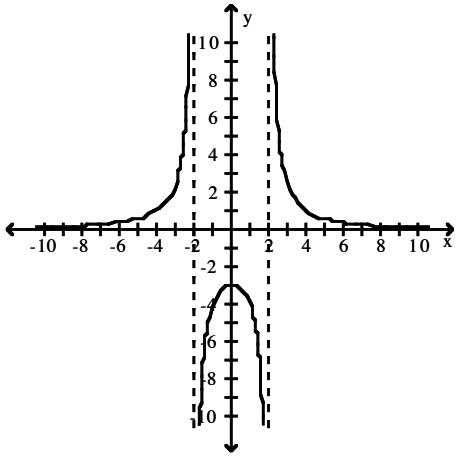
B)



C)

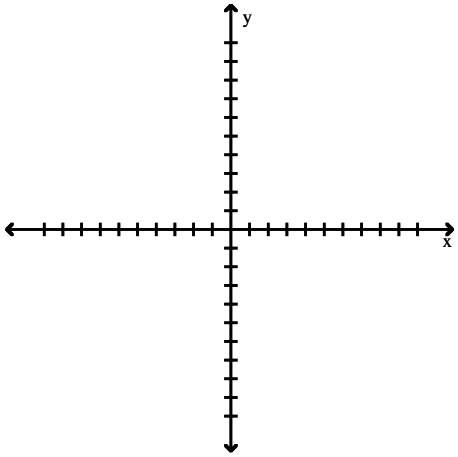


D)

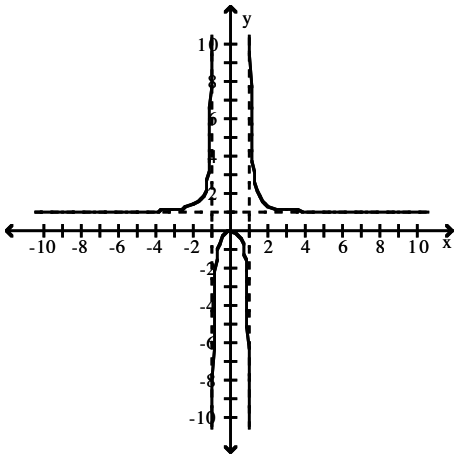


Answer: A

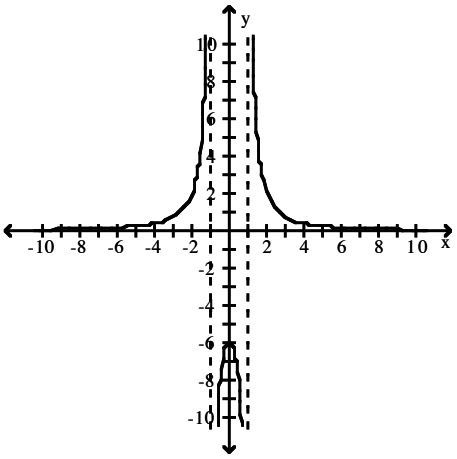
265) $f(x) = \dfrac{x^3}{x^2+1}$



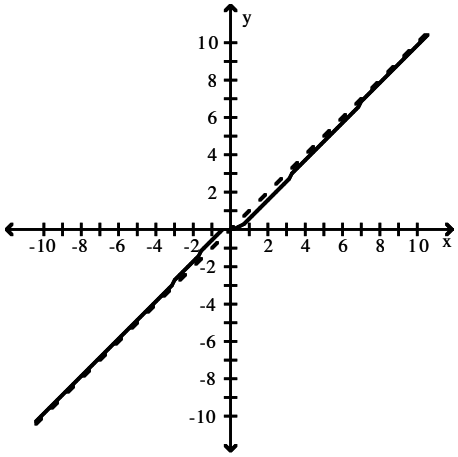
A)



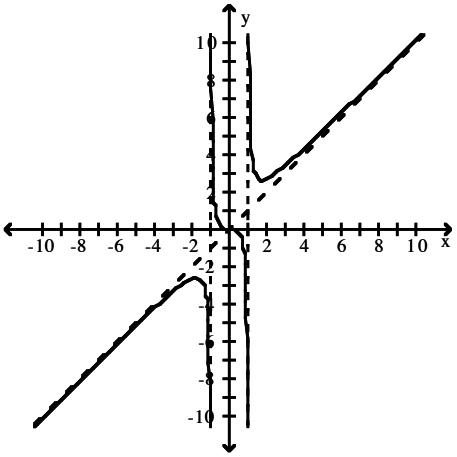
B)



C)

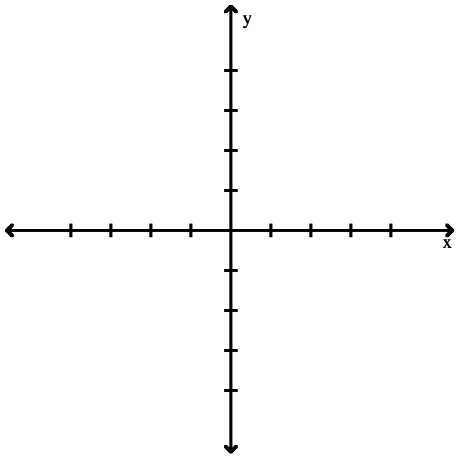


D)

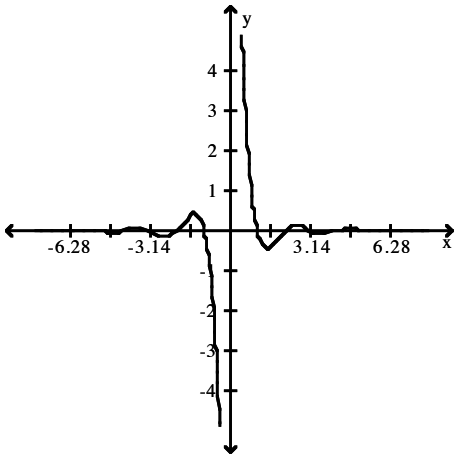


Answer: C

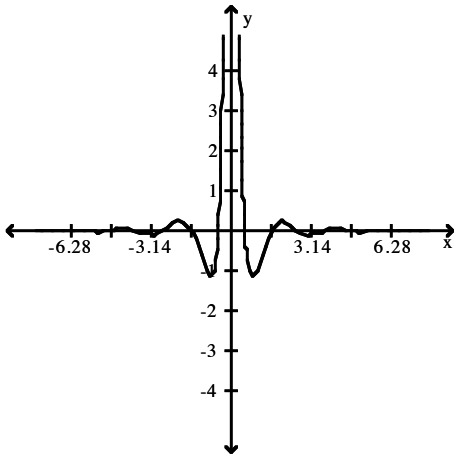
266) $f(x) = \dfrac{\sin 3x}{x}$



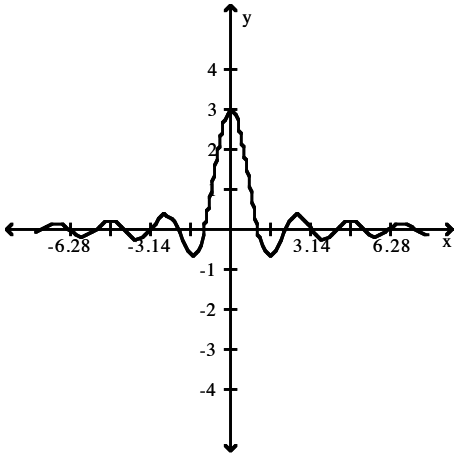
A)



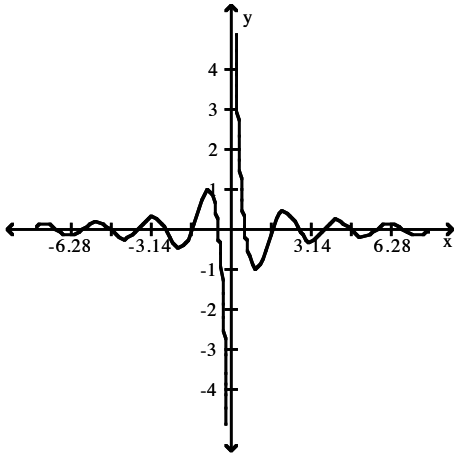
B)



C)



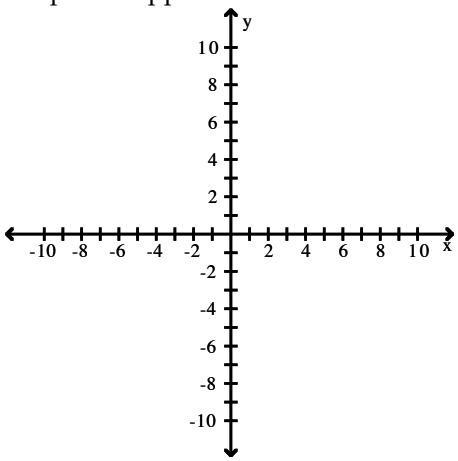
D)



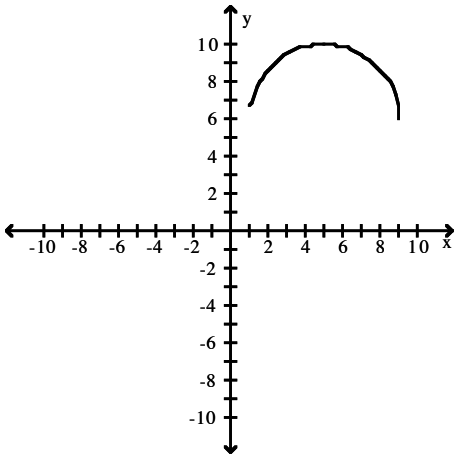
Answer: C

Graph the function.

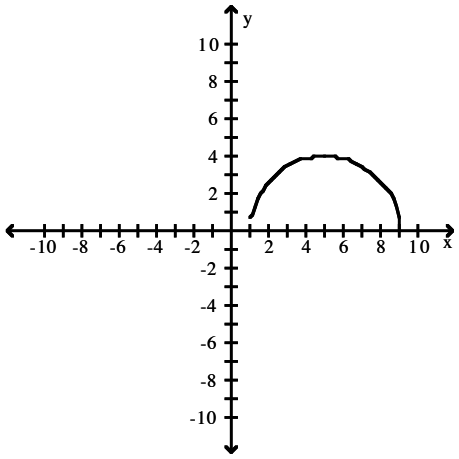
267) Graph the upper half of the circle defined by the equation $x^2 + y^2 - 10x - 12y + 45 = 0$.



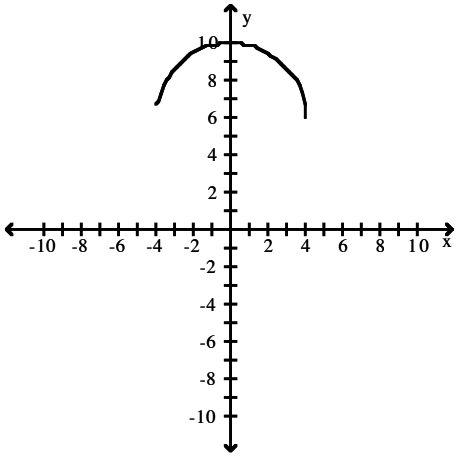
A)



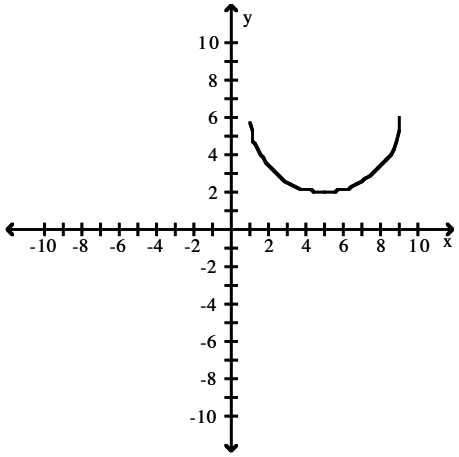
B)



C)

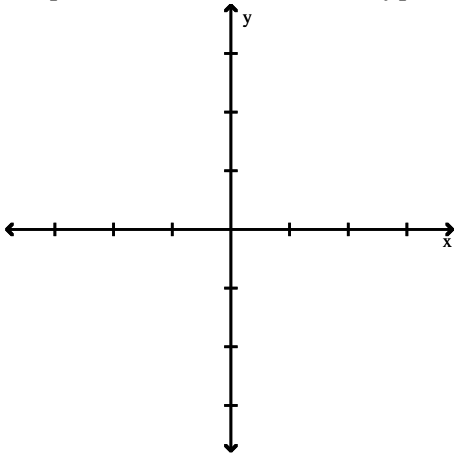


D)

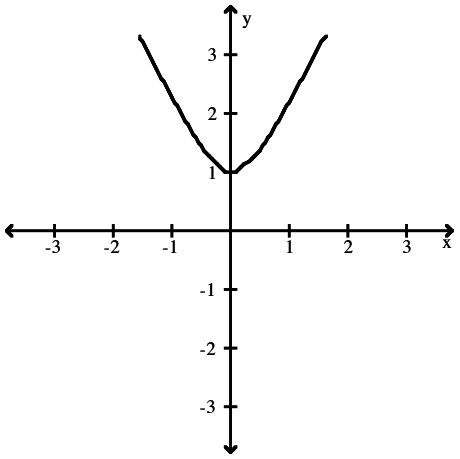


Answer: A

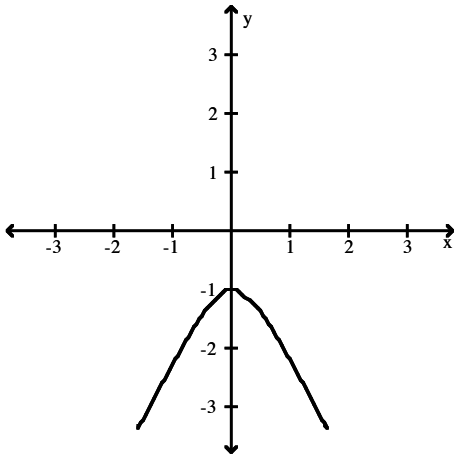
268) Graph the lower branch of the hyperbola $y^2 - 4x^2 = 1$.



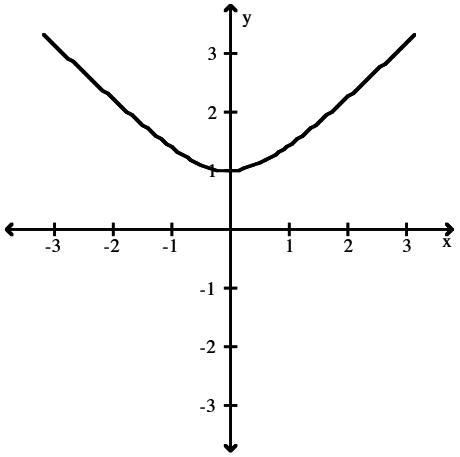
A)



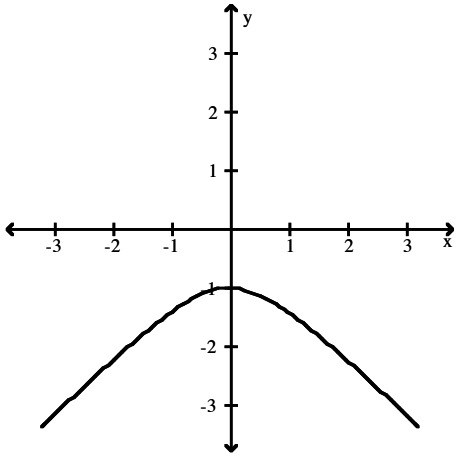
B)



C)

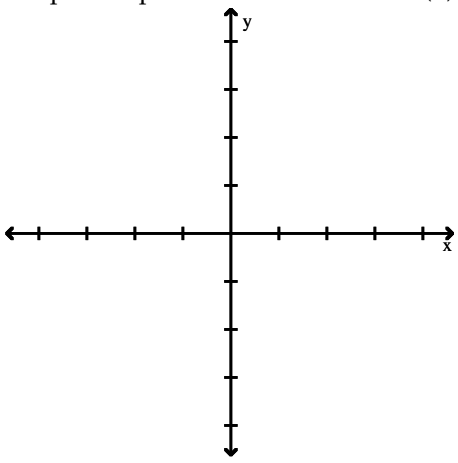


D)

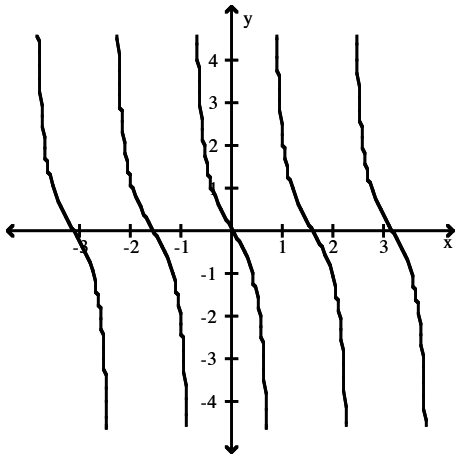


Answer: B

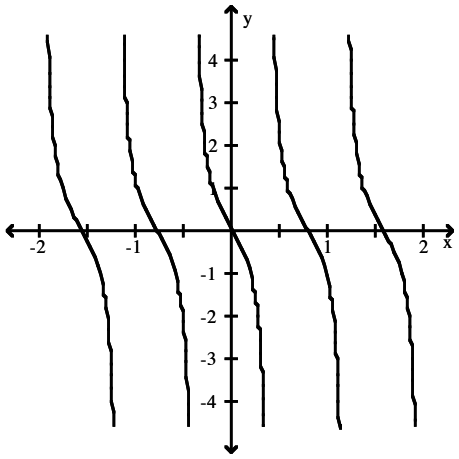
269) Graph five periods of the function f(x) = tan 4x.



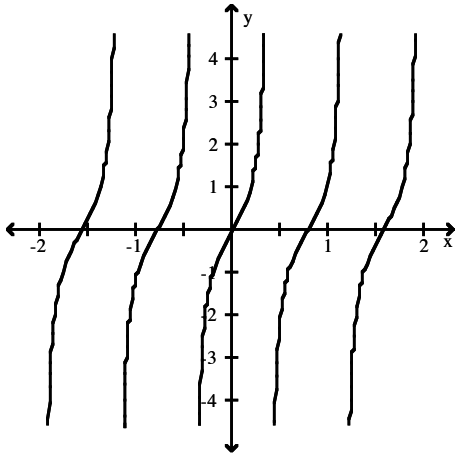
A)



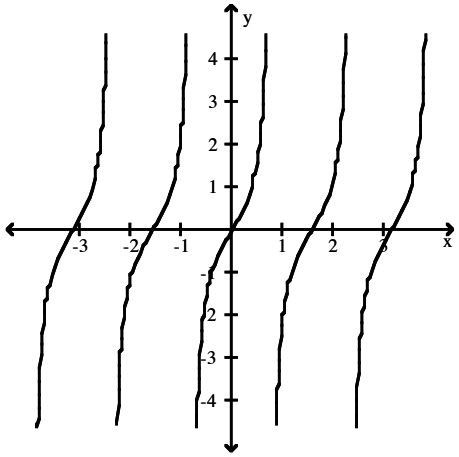
B)



C)

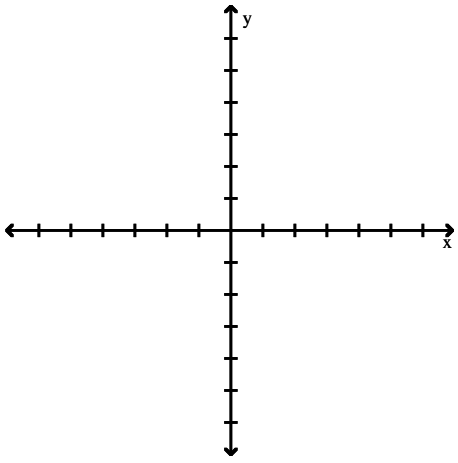


D)

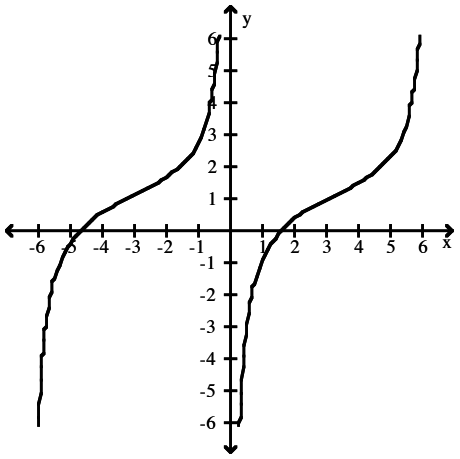


Answer: C

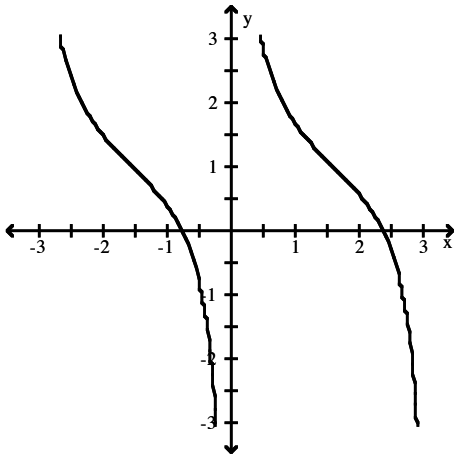
270) Graph two periods of the function $f(x) = -\cot\frac{x}{2} + 1$.



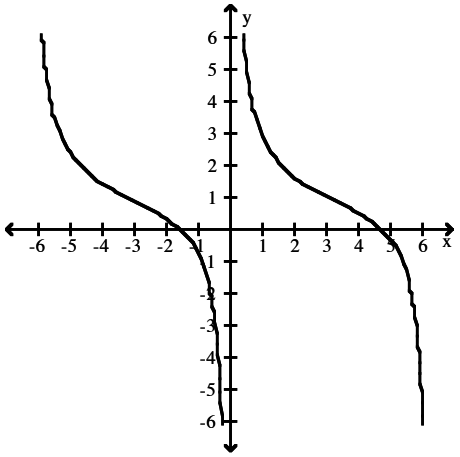
A)



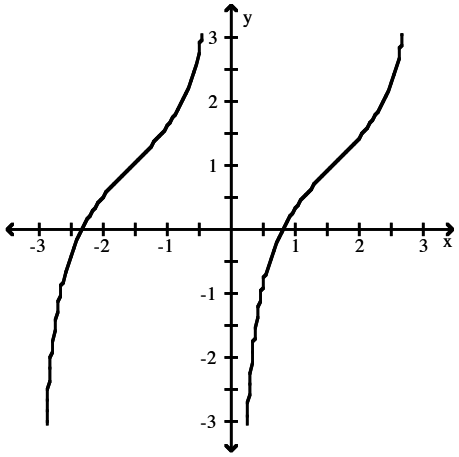
B)



C)

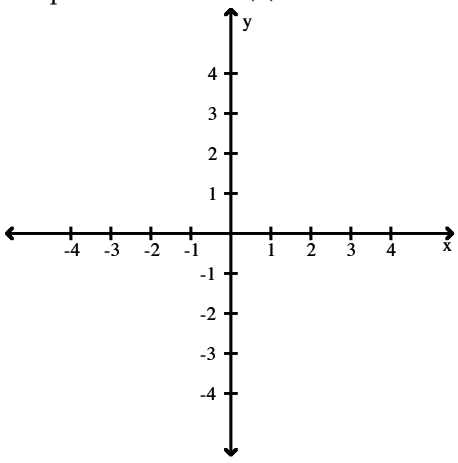


D)

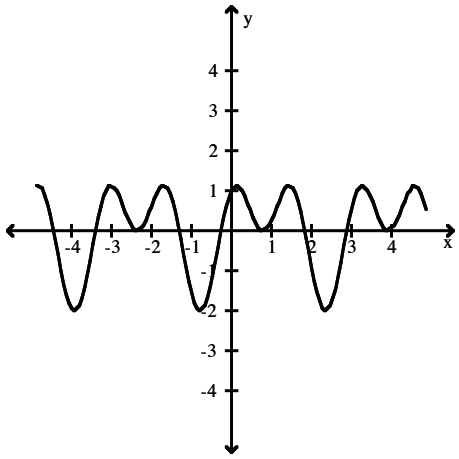


Answer: A

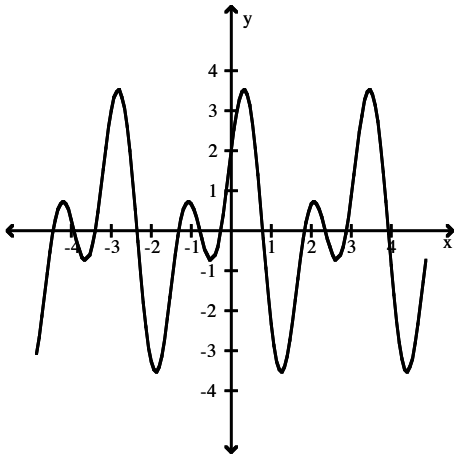
271) Graph the function $f(x) = \sin 4x + \cos 2x$.



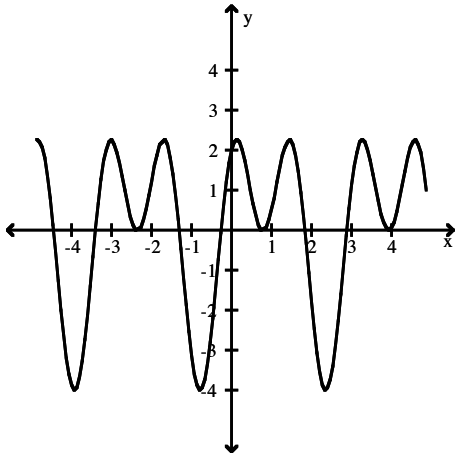
A)



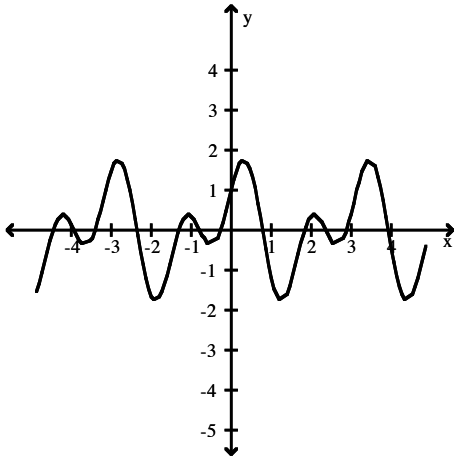
B)



C)

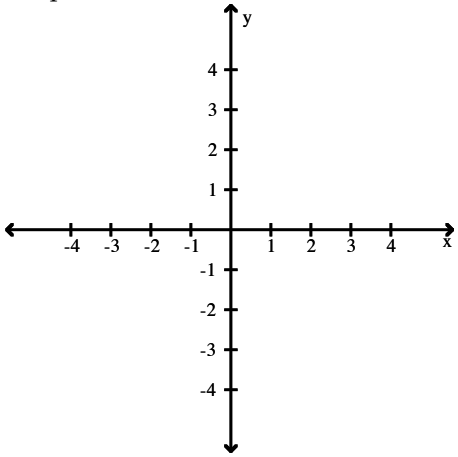


D)

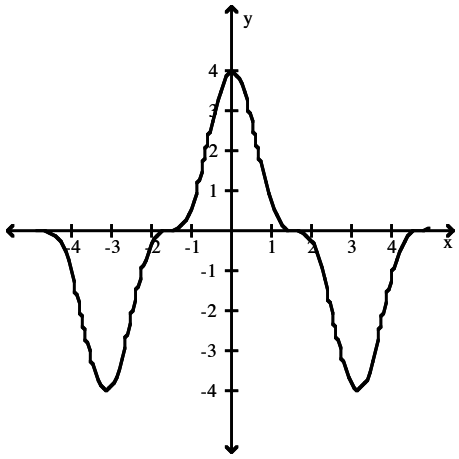


Answer: D

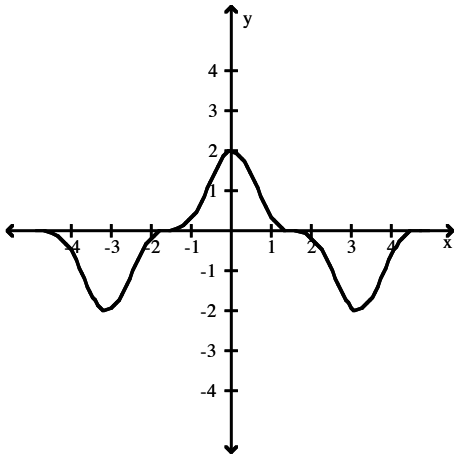
272) Graph the function $f(x) = 2\cos^3 x$.



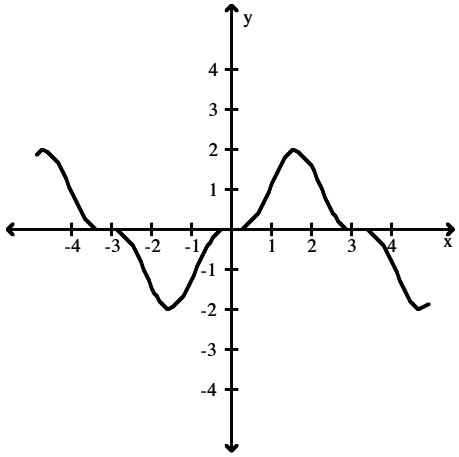
A)



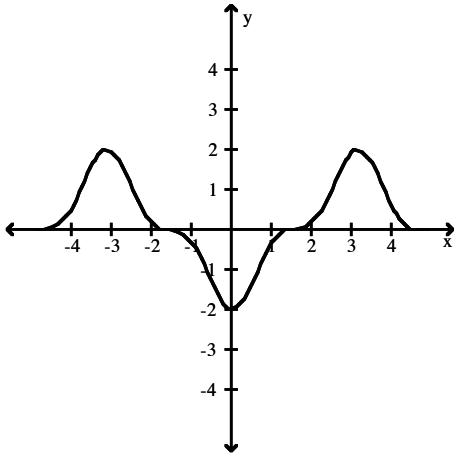
B)



C)



D)



Answer: B