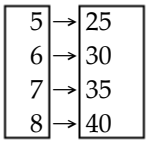
Chapter 3
Sullivan 8th Edition
Practice for the Exam
Kincade

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

**Determine whether the relation represents a function. If it is a function, state the domain and range.**

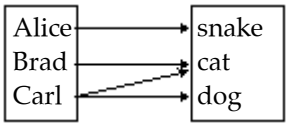
1) 

1) _____

A) function
domain:{25, 30, 35, 40}
range: {5, 6, 7, 8}

B) function
domain: {5, 6, 7, 8}
range: {25, 30, 35, 40}

C) not a function

2) 

2) _____

A) function
domain: {snake, cat, dog}
range: {Alice, Brad, Carl}

B) function
domain: {Alice, Brad, Carl}
range: {snake, cat, dog}

C) not a function

3) {(–3, 12), (–2, 7), (0, 3), (2, 7), (4, 19)}
3) _____

A) function
domain: {12, 7, 3, 19}
range: {–3, –2, 0, 2, 4}

B) function
domain: {–3, –2, 0, 2, 4}
range: {12, 7, 3, 19}

C) not a function

4) {(8.22, 13.82), (8.222, –13.8), $(\frac{3}{7}, 0)$, (0.43, –8)}
4) _____

A) function
domain: {8.22, 8.222, $\frac{3}{7}$, 0.43}
range: {13.82, –13.8, 0, –8}

B) function
domain: {13.82, –13.8, 0, –8}
range: {8.22, 8.222, $\frac{3}{7}$, 0.43}

C) not a function

**Determine whether the equation is a function.**

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

A) function B) not a function

6) $y = |x|$ 6) _____

A) function B) not a function

7) $y = \pm\sqrt{1 - 7x}$ 7) _____

A) function B) not a function

8) $y^2 + x = 7$ 8) _____

A) function B) not a function

9) $y = 3x^2 - 6x + 7$ 9) _____

A) function B) not a function

**Find the value for the function.**

10) Find f(2) when $f(x) = \sqrt{x^2 + 8x}$. 10) _____

A) $6\sqrt{2}$ B) $2\sqrt{17}$ C) $2\sqrt{5}$ D) $2\sqrt{3}$

11) Find –f(x) when $f(x) = -3x^2 + 3x + 3$. 11) _____

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

12) Find f(x – 1) when $f(x) = 4x^2 + 2x + 3$. 12) _____

A) $4x^2 - 6x + 9$ B) $4x^2 + 14x + 9$ C) $4x^2 - 6x + 5$ D) $-6x^2 + 4x + 5$

13) Find f(x + h) when $f(x) = -2x^2 - 3x - 4$. 13) _____

A) $-2x^2 - 2h^2 - 3x - 3h - 4$ B) $-2x^2 - 4xh - 2h^2 - 3x - 3h - 4$

C) $-2x^2 - 2xh - 2h^2 - 3x - 3h - 4$ D) $-2x^2 - 2h^2 - 7x - 7h - 4$

14) Find f(x + h) when $f(x) = \frac{9x + 2}{5x - 2}$. 14) _____

A) $\frac{9x + 9h + 2}{5x - 2}$ B) $\frac{9x + 9h + 2}{5x + 5h - 2}$ C) $\frac{9x + 11h}{5x + 3h}$ D) $\frac{9x + 2h}{5x - 2h}$

**Solve the problem.**

15) If $f(x) = \frac{x - 5A}{-10x + 4}$ and f(–10) = 10, what is the value of A? 15) _____

A) A = 106 B) A = –210 C) A = –106 D) A = 210

**Find the domain of the function.**

16) $g(x) = \frac{x}{x^2 - 1}$ 16) _____

A) $\{x \mid x > 1\}$ B) $\{x \mid x \neq 0\}$ C) all real numbers D) $\{x \mid x \neq -1, 1\}$

17) $f(x) = x^2 + 8$ 17) _____

A) $\{x \mid x > -8\}$ B) $\{x \mid x \neq -8\}$ C) $\{x \mid x \geq -8\}$ D) all real numbers

18) $h(x) = \dfrac{x - 2}{x^3 - 36x}$ 18) _____

A) $\{x \mid x \neq 2\}$ B) all real numbers C) $\{x \mid x \neq -6, 0, 6\}$ D) $\{x \mid x \neq 0\}$

19) $f(x) = \sqrt{4 - x}$ 19) _____

A) $\{x \mid x \neq 2\}$ B) $\{x \mid x \leq 2\}$ C) $\{x \mid x \leq 4\}$ D) $\{x \mid x \neq 4\}$

20) $\dfrac{x}{\sqrt{x - 8}}$ 20) _____

A) $\{x \mid x > 8\}$ B) $\{x \mid x \neq 8\}$ C) $\{x \mid x \geq 8\}$ D) all real numbers

**For the given functions f and g, find the requested function and state its domain.**

21) $f(x) = 8 - 8x$; $g(x) = -4x + 8$ 21) _____

Find $f + g$.

A) $(f + g)(x) = -4x + 16$; $\{x \mid x \neq -4\}$ B) $(f + g)(x) = -12x + 16$; all real numbers

C) $(f + g)(x) = 4x$; all real numbers D) $(f + g)(x) = -4x + 8$; $\{x \mid x \neq 2\}$

22) $f(x) = 4x + 1$; $g(x) = 6x - 5$ 22) _____

Find $\dfrac{f}{g}$.

A) $(\dfrac{f}{g})(x) = \dfrac{6x - 5}{4x + 1}$; $\{x \mid x \neq \dfrac{5}{6}\}$ B) $(\dfrac{f}{g})(x) = \dfrac{4x + 1}{6x - 5}$; $\{x \mid x \neq \dfrac{5}{6}\}$

C) $(\dfrac{f}{g})(x) = \dfrac{6x - 5}{4x + 1}$; $\{x \mid x \neq -\dfrac{1}{4}\}$ D) $(\dfrac{f}{g})(x) = \dfrac{4x + 1}{6x - 5}$; $\{x \mid x \neq -\dfrac{1}{4}\}$

23) $f(x) = x - 5$; $g(x) = 9x^2$ 23) _____

Find $f - g$.

A) $(f - g)(x) = -9x^2 + x - 5$; all real numbers B) $(f - g)(x) = 9x^2 - x + 5$; all real numbers

C) $(f - g)(x) = 9x^2 + x - 5$; all real numbers D) $(f - g)(x) = -9x^2 + x - 5$; $\{x \mid x \neq 5\}$

24) $f(x) = 5x^3 + 1$; $g(x) = 5x^2 + 3$ 24) _____

Find $f \cdot g$.

A) $(f \cdot g)(x) = 25x^6 + 15x^3 + 5x^2 + 3$; all real numbers

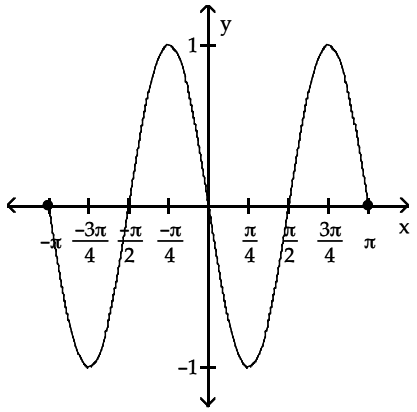
B) $(f \cdot g)(x) = 5x^3 + 5x^2 + 3$; all real numbers

C) $(f \cdot g)(x) = 25x^5 + 15x^3 + 5x^2 + 3$; $\{x \mid x \neq 0\}$

D) $(f \cdot g)(x) = 25x^5 + 15x^3 + 5x^2 + 3$; all real numbers

**Determine whether the graph is that of a function. If it is, use the graph to find its domain and range, the intercepts, if any, and any symmetry with respect to the x–axis, the y–axis, or the origin.**

25) 25) _____



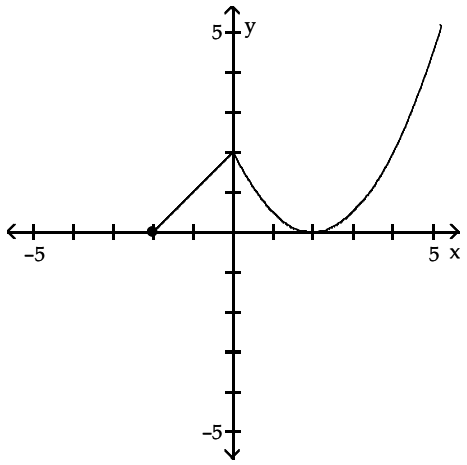

A) function
domain: $\{x \mid -1 \le x \le 1\}$
range: $\{y \mid -\pi \le y \le \pi\}$
intercepts: $(-\pi, 0)$, $(-\frac{\pi}{2}, 0)$, $(0, 0)$, $(\frac{\pi}{2}, 0)$, $(\pi, 0)$
symmetry: none

B) function
domain: $\{x \mid -\pi \le x \le \pi\}$
range: $\{y \mid -1 \le y \le 1\}$
intercepts: $(-\pi, 0)$, $(-\frac{\pi}{2}, 0)$, $(0, 0)$, $(\frac{\pi}{2}, 0)$, $(\pi, 0)$
symmetry: origin

C) function
domain: all real numbers
range: $\{y \mid -1 \le y \le 1\}$
intercepts: $(-\pi, 0)$, $(-\frac{\pi}{2}, 0)$, $(0, 0)$, $(\frac{\pi}{2}, 0)$, $(\pi, 0)$
symmetry: origin

D) not a function

26) 26) _____




A) function
domain: {x | x ≥ –2}
range: {y | y ≥ 0}
intercepts: (–2, 0), (0, 2), (2, 0)
symmetry: none

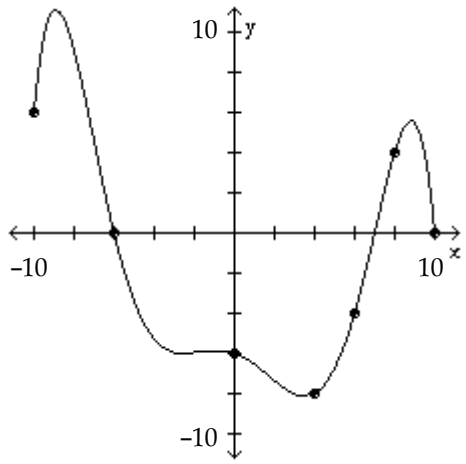
B) function
domain: all real numbers
range: all real numbers
intercepts: (–2, 0), (0, 2), (2, 0)
symmetry: none

C) function
domain: {x | x ≥ 0}
range: {y | y ≥ –2}
intercepts: (–2, 0), (0, 2), (2, 0)
symmetry: y–axis

D) not a function

**The graph of a function f is given. Use the graph to answer the question.**

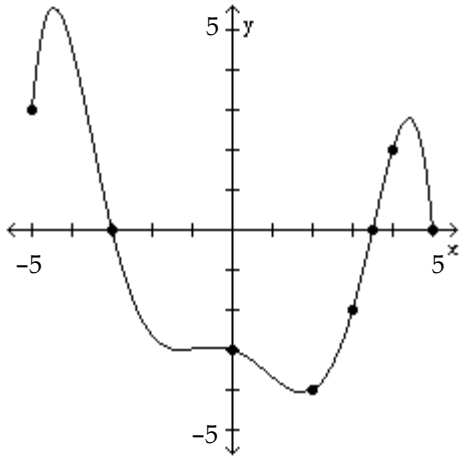
27) Is f(8) positive or negative? 27) _____




A) positive

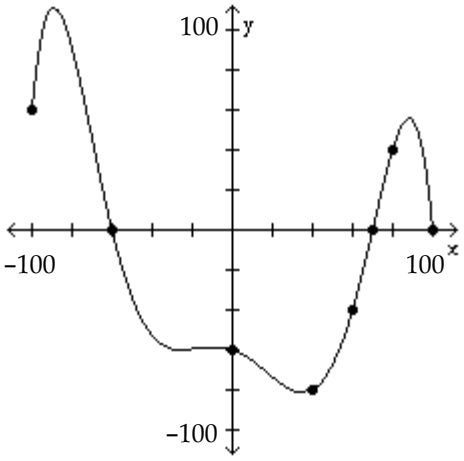
B) negative

28) For what numbers x is f(x) > 0? 28) _____




A) [–5, –3), (3.5, 5) B) (–∞ –3) C) (–3, ∞) D) (–3, 3.5)

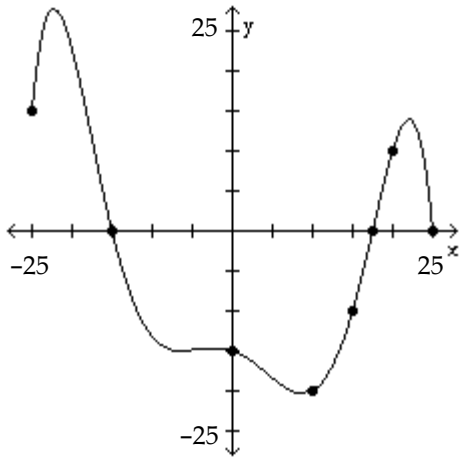
29) How often does the line y = –100 intersect the graph? 29) _____




A) once B) twice

C) three times D) does not intersect

30) For which of the following values of x does f(x) = –20? 30) _____




A) 15 B) 10 C) 0 D) –20

**Answer the question about the given function.**

31) Given the function $f(x) = -4x^2 + 8x - 6$, what is the domain of f? 31) _____

A) all real numbers B) {x | x ≥1} C) {x | x ≤ 1} D) {x | x ≥ –1}

32) Given the function $f(x) = 4x^2 - 8x + 3$, is the point (2, 11) on the graph of f? 32) _____

A) Yes B) No

33) Given the function $f(x) = \frac{x^2 + 2}{x + 4}$, what is the domain of f? 33) _____

A) {x | x ≠ –4} B) {x | x ≠ 2} C) {x | x ≠ 4} D) $\{x \mid x \neq -\frac{1}{2}\}$

34) Given the function $f(x) = \frac{x^2 + 5}{x - 3}$, list the x–intercepts, if any, of the graph of f. 34) _____

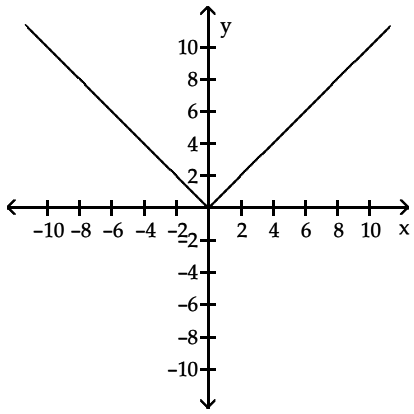
A) $(-\sqrt{5}, 0)$ B) (3, 0) C) (5, 0), (–5, 0) D) none

35) Given the function $f(x) = \frac{x^2 + 8}{x - 6}$, list the y–intercept, if there is one, of the graph of f. 35) _____

A) (0, 6) B) $(-\frac{4}{3}, 0)$ C) $(0, -\frac{4}{3})$ D) (0, –8)

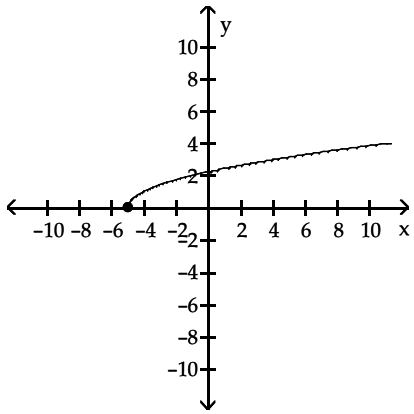
**The graph of a function is given. Decide whether it is even, odd, or neither.**

36) 36) _____



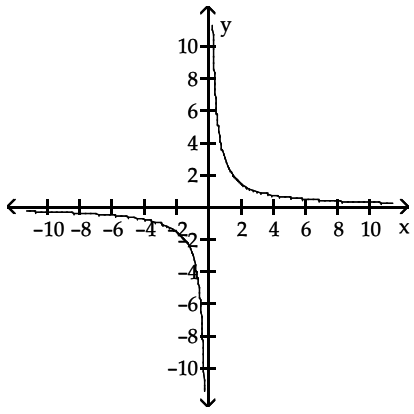

A) even B) odd C) neither

37) 37) _____

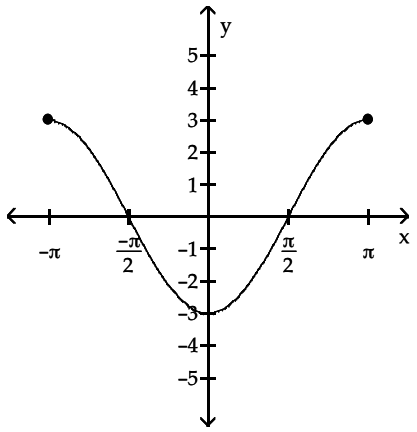



A) even B) odd C) neither

38) 38) _____




A) even B) odd C) neither

39) 


39) _____

A) even B) odd C) neither

**Determine algebraically whether the function is even, odd, or neither.**

40) $f(x) = -6x^2 + 8$ 40) _____

A) even B) odd C) neither

41) $\sqrt[3]{9x^2 + 4}$ 41) _____

A) even B) odd C) neither

42) $f(x) = \frac{x}{x^2 + 4}$ 42) _____

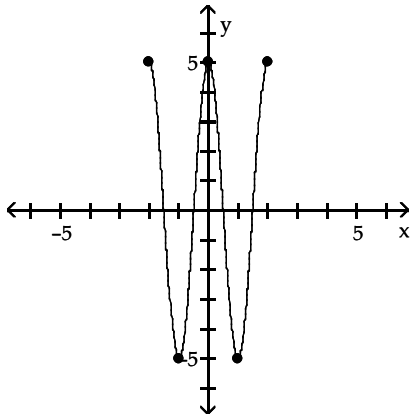
A) even B) odd C) neither

43) $f(x) = \frac{5x}{|x|}$ 43) _____

A) even B) odd C) neither

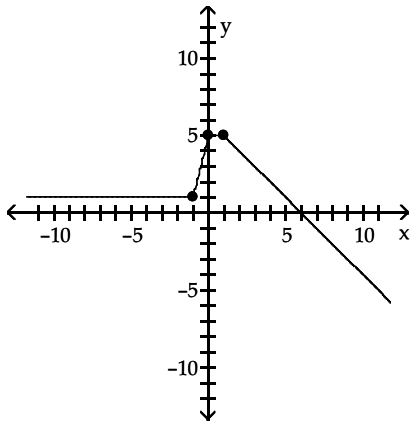
**The graph of a function is given. Determine whether the function is increasing, decreasing, or constant on the given interval.**

44) (– 2, – 1) 44) _____



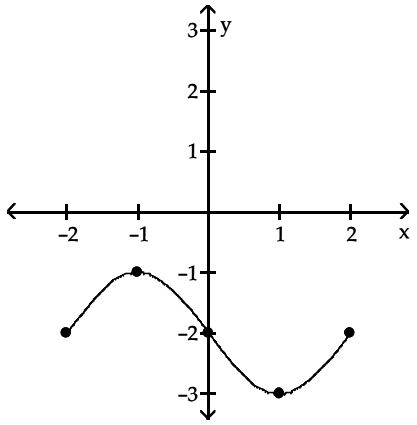

A) increasing B) constant C) decreasing

45) (0, 1) 45) _____




A) decreasing B) constant C) increasing

46) (−1, 0) 46) _____

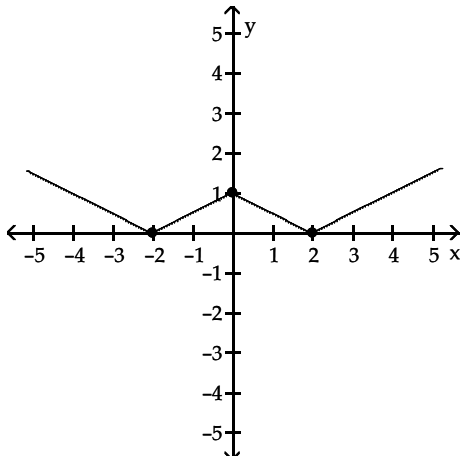



A) increasing B) decreasing C) constant

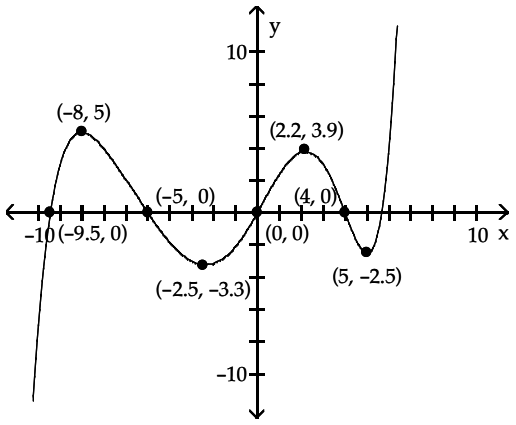
**SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.**

**The graph of a function f is given. Use the graph to answer the question.**

47) Find the numbers, if any, at which f has a local minimum. What are the local minima? 47) _____



48) 48) _____




Find the numbers, if any, at which f has a local maximum. What are the local maxima?

**Use a graphing utility to graph the function over the indicated interval and approximate any local maxima and local minima. Determine where the function is increasing and where it is decreasing. If necessary, round answers to two decimal places.**

49) $f(x) = x^3 - 4x^2 + 6$; $(-1, 4)$ 49) _____

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

50) $f(x) = x^3 - 3x + 3$, $(-2, 2)$ 50) _____

A) local maximum at (1, 1)
local minimum at (–1, 5)
increasing on (–2, –1)
decreasing on (–1, 1)

B) local maximum at (–1, 5)
local minimum at (1, 1)
increasing on (–2, –1) and (1, 2)
decreasing on (–1, 1)

C) local maximum at (–1, 5)
local minimum at (1, 1)
increasing on (–1, 1)
decreasing on (–2, –1) and (1, 2)

D) local maximum at (1, 1)
local minimum at (–1, 5)
increasing on (–2, –1) and (1, 2)
decreasing on (–1, 1)

**Find the average rate of change for the function between the given values.**

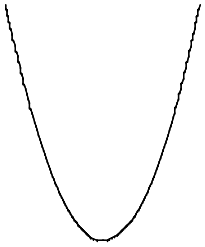
51) $f(x) = x^2 + 1x$; from 1 to 4 51) _____

A) $\frac{9}{2}$ B) 6 C) $\frac{20}{3}$ D) 5

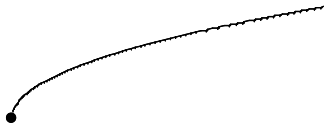
52) $f(x) = \sqrt{2x}$; from 2 to 8 52) _____

A) 7 B) $-\frac{3}{10}$ C) $\frac{1}{3}$ D) 2

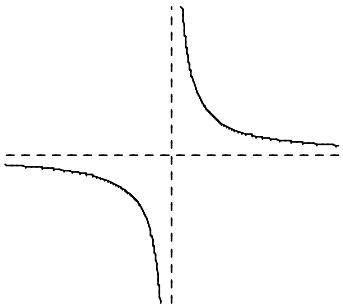
**Match the graph to the function listed whose graph most resembles the one given.**

53)  53) _____

A) square function
B) absolute value function
C) reciprocal function
D) cube function

54)  54) _____

A) cube function
B) cube root function
C) square function
D) square root function

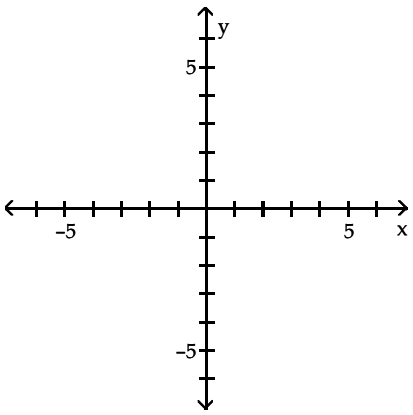
55)  55) _____

A) square root function
B) absolute value function
C) reciprocal function
D) square function

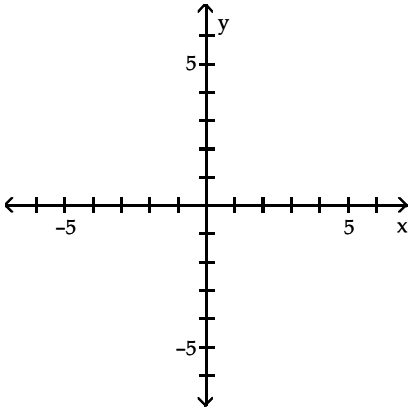
**SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.**

**Graph the function.**

56) $f(x) = \sqrt[3]{x}$ 56) _____

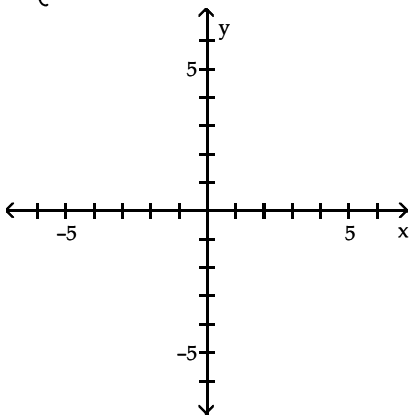



57) $f(x) = |x|$ 57) _____

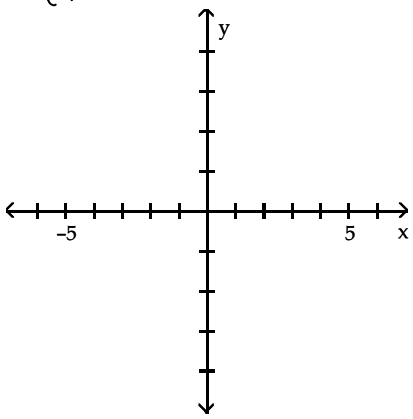



58) 58) _____

$$f(x) = \begin{cases} x + 3 & \text{if } x < 1 \\ 2 & \text{if } x \geq 1 \end{cases}$$

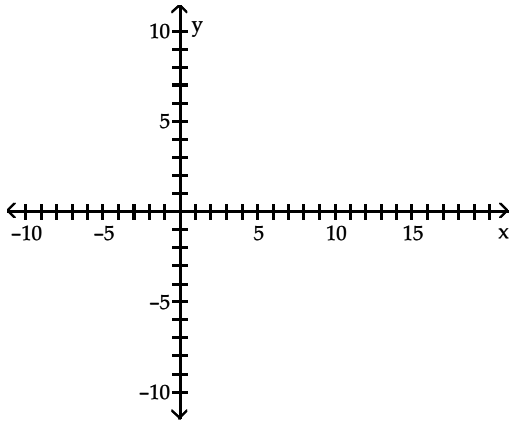


59) $f(x) = \begin{cases} -x + 2 & x < 0 \\ \sqrt{x} + 3 & x \geq 0 \end{cases}$ 59) _____



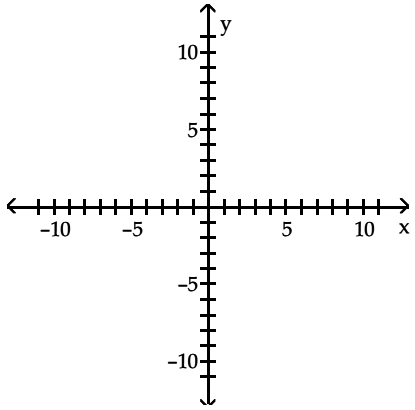

60) 60) _____

$$f(x) = \begin{cases} 1 & \text{if } -2 \leq x < 5 \\ |x| & \text{if } 5 \leq x < 8 \\ \sqrt[3]{x} & \text{if } 8 \leq x \leq 12 \end{cases}$$

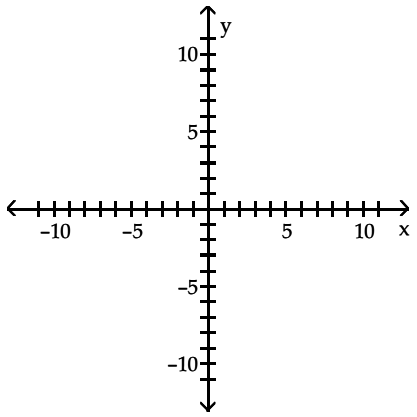



**Graph the function by starting with the graph of the basic function and then using the techniques of shifting, compressing, stretching, and/or reflecting.**

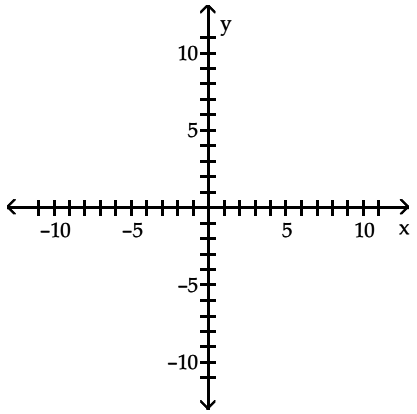
61) $f(x) = \sqrt{x - 3} - 5$ 61) _____



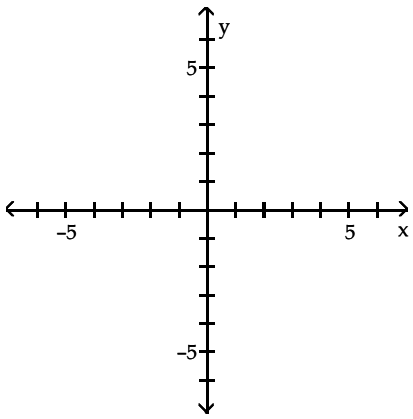
62) $f(x) = |x| + 5$ 62) _____



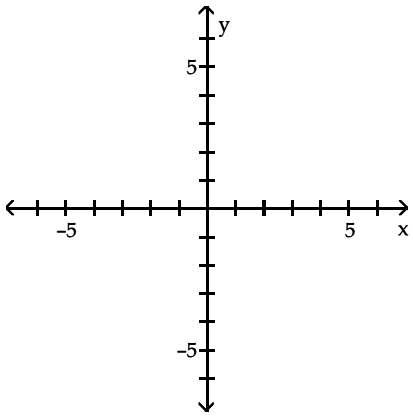

63) $f(x) = \frac{1}{x} + 5$ 63) _____



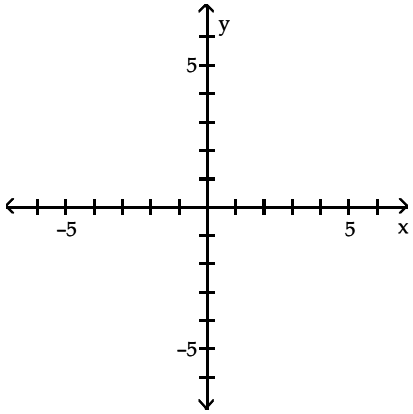

64) $f(x) = \frac{1}{3}x^3$ 64) _____



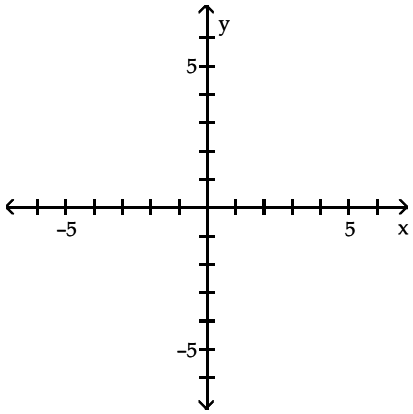
65) $f(x) = \frac{1}{6}|x|$ 65) _____



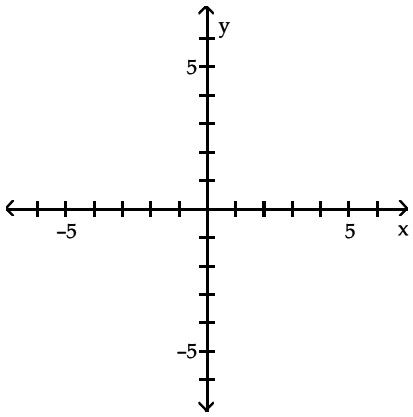

66) $f(x) = -x^2$ 66) _____



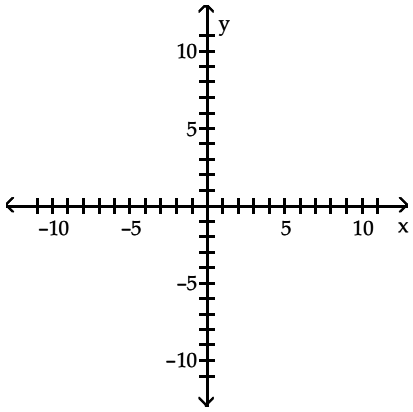

67) $f(x) = \sqrt{-x}$ 67) _____



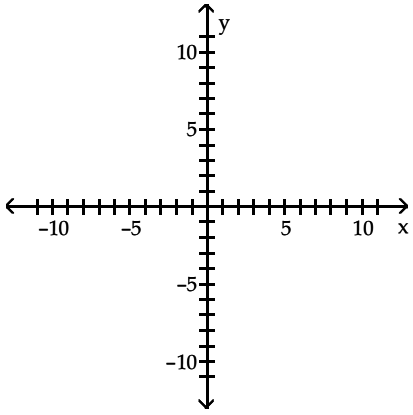
68) $f(x) = -|x|$ 68) _____



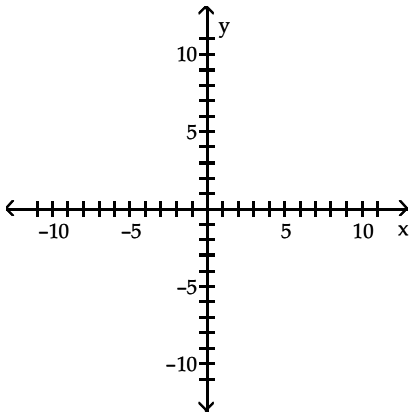

69) $f(x) = 3(x + 1)^2 - 2$ 69) _____




70) $f(x) = -(x - 4)^2 - 2$ 70) _____

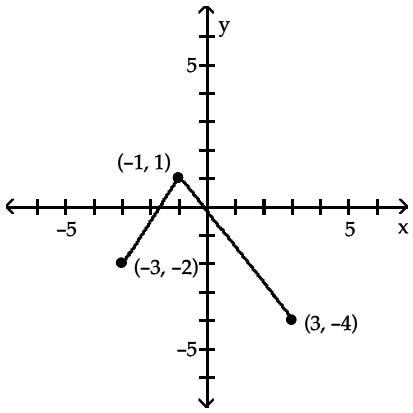


71) $f(x) = \sqrt{x + 5} - 6$ 71) _____




**Using transformations, sketch the graph of the requested function.**

72) The graph of a function f is illustrated. Use the graph of f as the first step toward graphing the function F(x), where $F(x) = f(x + 2) - 1$. 72) _____




**Find the function that is finally graphed after the following transformations are applied to the graph of $y = \sqrt{x}$.**

73) i) Shift up 2 units 73) _____
ii) Reflect about the y−axis
iii) Shift left 5 units

1) B
2) C
3) B
4) A
5) A
6) A
7) B
8) B
9) A
10) C
11) D
12) C
13) B
14) B
15) B
16) D
17) D
18) C
19) C
20) A
21) B
22) B
23) A
24) D
25) B
26) A
27) A
28) A
29) D
30) B
31) A
32) B
33) A
34) D
35) C
36) A
37) C
38) B
39) A
40) A
41) A
42) B
43) B
44) C
45) B
46) B
47) f has a local minimum at x = –2 and 2; the local minimum is 0
48) f has a local maximum at x = –8 and 2.2; the local maximum at –8 is 5; the local maximum at 2.2 is 3.9

49) local maximum at (0, 6)
local minimum at (2.67, –3.48)
increasing on (–1, 0) and (2.67, 4)
decreasing on (0, 2.67)

50) B

51) B

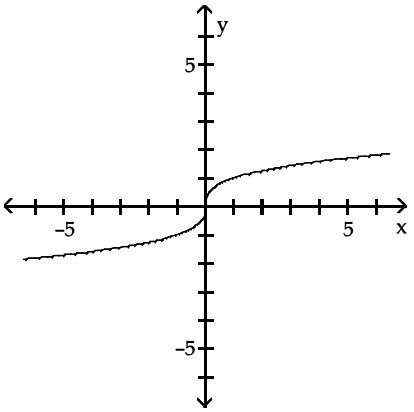
52) C

53) A

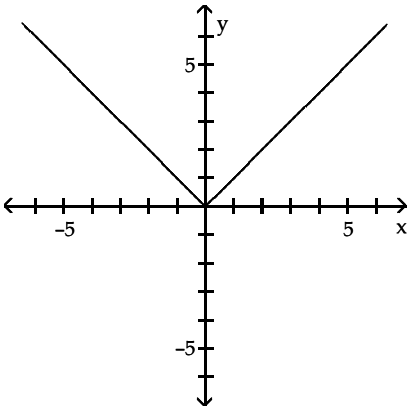
54) D

55) C

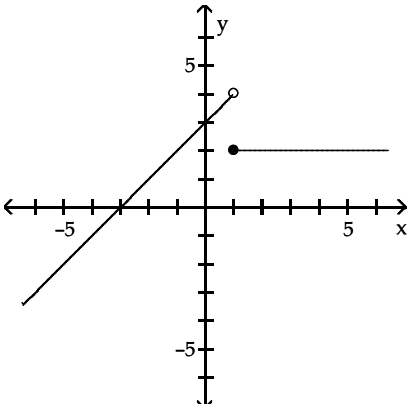
56)



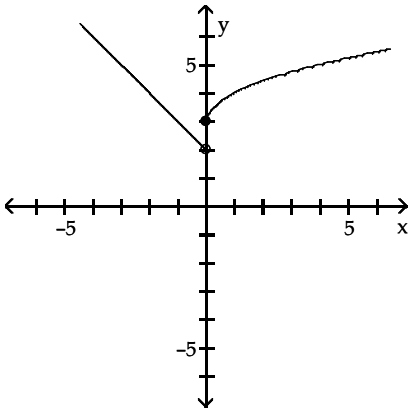

57)



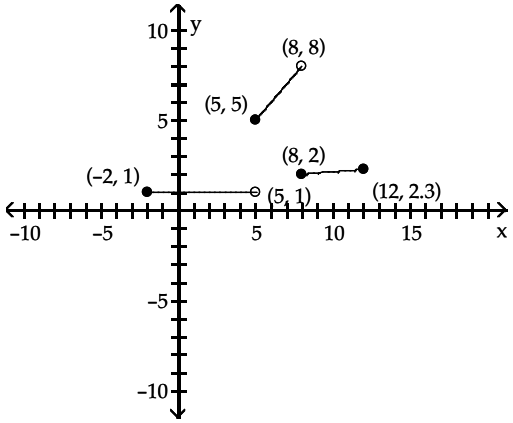

58)



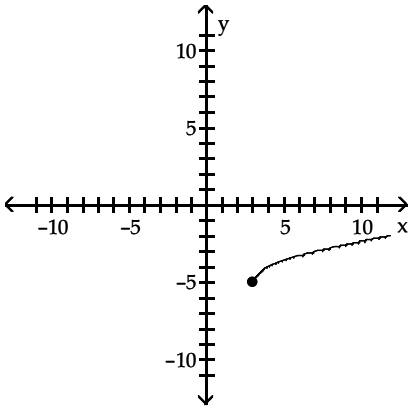
59)


y
5
–5
5
x
–5

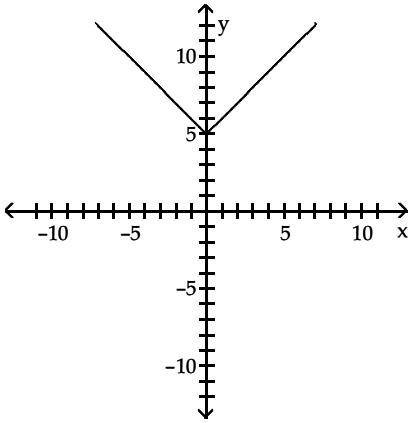
60)


10
y
(8, 8)
(5, 5)
5
(8, 2)
(–2, 1)
(5, 1)
(12, 2.3)
–10
–5
5
10
15
x
–5
–10

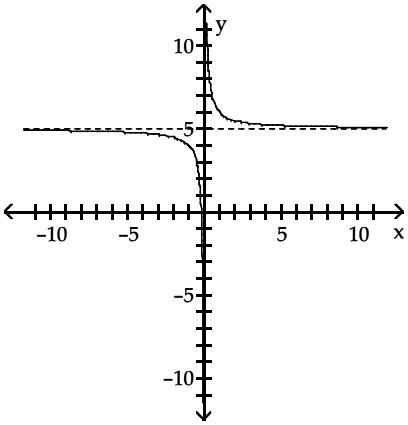
61)


y
10
5
–10
–5
5
10
x
–5
–10

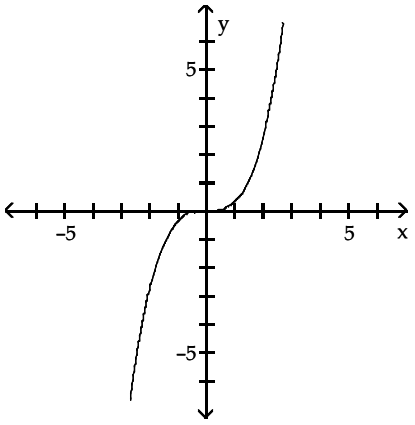
62)



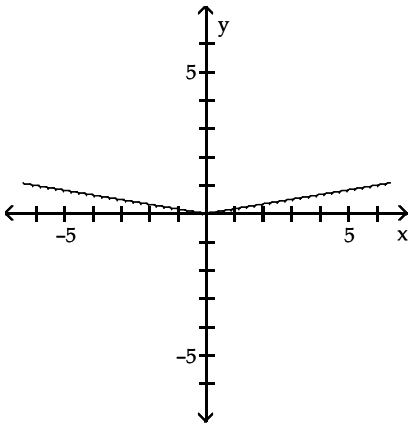

63)



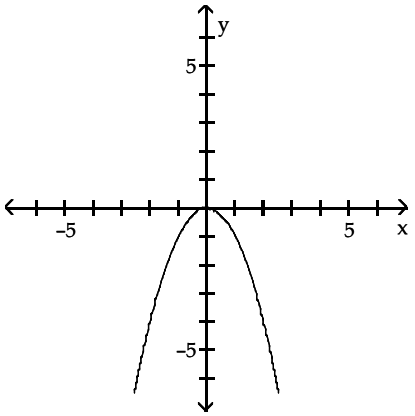

64)



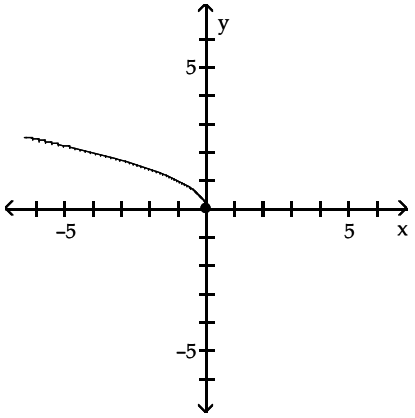
65)



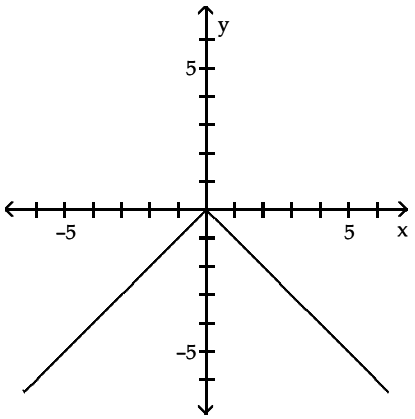

66)



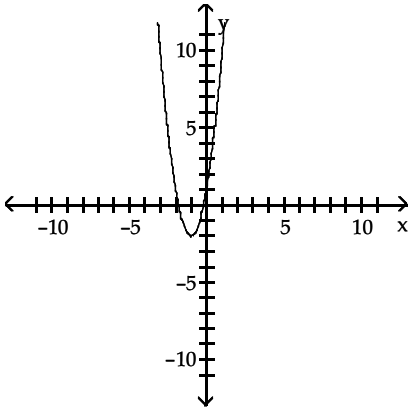

67)



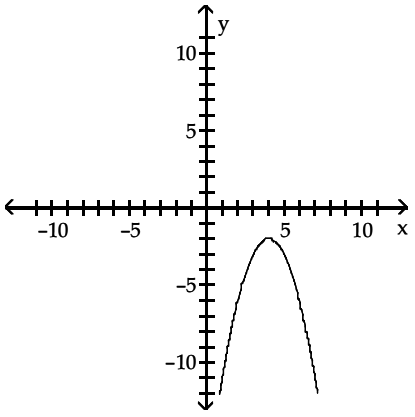
68)



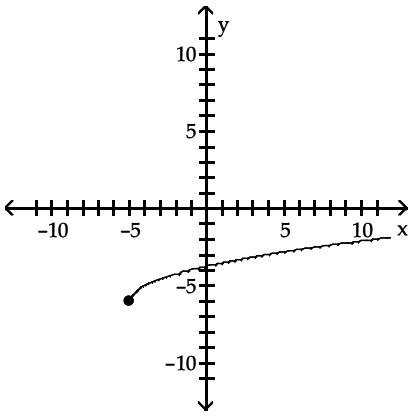

69)



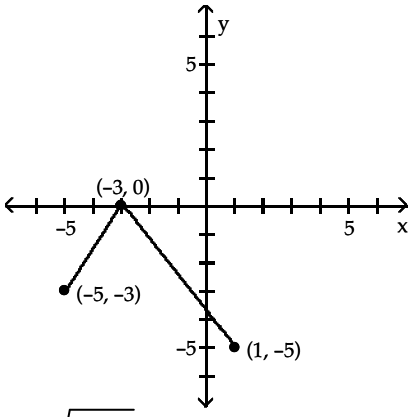

70)



71)




72)




73) $y = \sqrt{-x - 5} + 2$