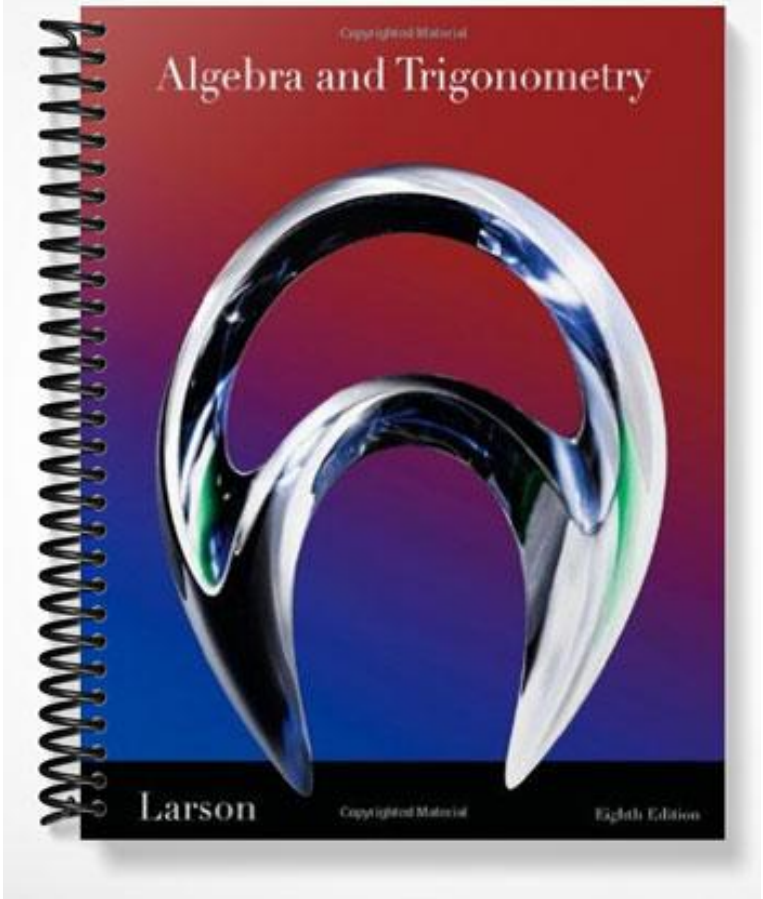
TEST BANK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Larson
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Eighth Edition

Lar_AT_8e_Ch02

Student: _____

1. Write the slope-intercept form of the equation of the line through the given point perpendicular to the given line.

point: (–7, –8) line: $-9x - 45y = 9$

A. $y = \frac{1}{9}x - \frac{65}{9}$

B. $y = 5x - \frac{43}{5}$

C. $y = 5x + 27$

D. $y = -9x + 55$

E. $y = -\frac{1}{5}x - \frac{47}{5}$

2. Gretel's Computer Repair Store purchases a network server for $1145. The machine has a useful life of 5 years after which time another one will have to be purchased. Assume depreciation of the machine is linear. Write a linear equation giving the value V of the network server during the 5 years it will be in use.

A. $V = -\frac{1}{229}t - 1145$

B. $V = 229t - 1145$

C. $V = -\frac{1}{229}t + 5$

D. $V = \frac{1}{229}t + 5$

E. $V = -229t + 1145$

3. Does the table describe a function?

Input value	2001	2002	2003	2004	2005
Output value	30	60	30	50	40

A. no
B. yes

4. Does the table describe a function?

Input value	10	30	10	20	40
Output value	2001	2002	2003	2004	2005

A. yes
B. no

5. Does the table describe a function?

Input value	1	3	4	3	1
Output value	–12	–7	0	7	12

A. yes
B. no

6. Does the table describe a function?

Input value	–4	–2	0	2	4
Output value	7	7	7	7	7

A. no
B. yes

7. Which set of ordered pairs represents a function from P to Q?

$P = \{5, 10, 15, 20\}$ $Q = \{-3, -1, 1\}$

A. $\{(5, 1), (15, -1), (5, -3), (15, 1)\}$

B. $\{(15, -3), (15, -1), (15, 1)\}$

C. $\{(5, -3), (10, -1), (10, 1), (15, -1), (20, -3)\}$

D. $\{(15, -1), (10, -3), (5, -1), (10, 1), (15, -3)\}$

E. $\{(10, -1), (15, 1), (20, -1)\}$

8. Which equation does not represent *y* as a function of *x*?

A. $2x = -9y$

B. $-4y = -9$

C. $6x^2 + 7y = -2$

D. $-9x + 7y = -9$

E. $-5y^2 + 7x = 3$

9. Which equation does not represent *y* as a function of *x*?

A. $y = \sqrt{8+x}$

B. $y = \left|-8+9x^2\right|$

C. $x = -6y+5$

D. $x = -1$

E. $y = 7x+9$

10. Evaluate the function at the specified value of the independent variable and simplify.

$q(y) = -6y-5$

$q(0.2)$

A. 3.8

B. $-1.2y+30$

C. $0.2y+5$

D. $0.2y-5$

E. –6.2

11. Evaluate the function at the specified value of the independent variable and simplify.

$$g(w) = \begin{cases} 2w, & w \le -1 \\ 2w^2 + 2w, & -1 \le w \le 1 \\ 2w^3 + 2w^2, & w > 1 \end{cases}$$

$g\left(\frac{1}{4}\right)$

A. $\frac{1}{5}$

B. $\frac{1}{2}$

C. $\frac{5}{32}$

D. $\frac{1}{16}$

E. $\frac{5}{8}$

12. Find all real values of x such that $f(x) = 0$.

$$f(x) = \frac{-6x - 9}{2}$$

A. $-\frac{3}{2}$

B. $-\frac{3}{4}$

C. $\pm\frac{3}{2}$

D. $\frac{3}{2}$

E. $\pm\frac{3}{4}$

13. Find all real values of x such that $f(x) = 0$.

$f(x) = 81x^2 - 49$

A. $\pm\frac{9}{7}$

B. $\pm\frac{7}{9}$

C. $-\frac{49}{81}$

D. $\frac{7}{9}$

E. $\pm\frac{49}{81}$

14. Find the value(s) of x for which $f(x) = g(x)$.

$f(x) = x^2 + 7x + 33$ $\quad g(x) = -6x - 9$

A. $-6, -7$

B. $6, 7$

C. $33, 7, -\frac{3}{2}$

D. $33, 26, -\frac{3}{2}$

E. $-40, -\frac{3}{2}$

15. Find the domain of the function.

$q(s) = \frac{8s}{s-6}$

A. $s = 6, s = 0$

B. $s = 6$

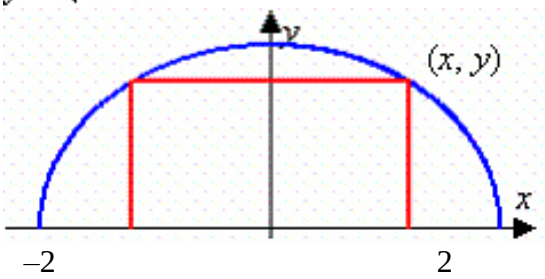
C. all real numbers $s \neq 6, s \neq 0$

D. all real numbers

E. all real numbers $s \neq 6$

16. A rectangle is bounded by the *x*-axis and the semicircle $y=\sqrt{4-x^2}$ (see figure). Write the area *A* of the rectangle as a function of *x* and determine the domain of the function.

$y=\sqrt{4-x^2}$



A. $A(x)=2|x|\sqrt{4-x^2}, \quad -2\le x\le 2$

B. $A(x)=2x\sqrt{4-x^2}, \quad -2\le x\le 2$

C. $A(x)=x\sqrt{4-x^2}, \quad x\ge 0$

D. $A(x)=2x\sqrt{4-x^2}, \quad x\ge 0$

E. $A(x)=|x|\sqrt{4-x^2}, \quad$ all real numbers

17. Find the difference quotient and simplify your answer.

$f(y) = -4y^2+6y, \quad \dfrac{f(1+h)-f(1)}{h}, \; h \ne 0$

A. $-2-4h$

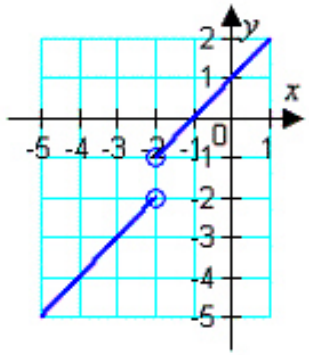
B. $6-4y+\dfrac{12}{y}$

C. $6-4h$

D. $-2-4y+\dfrac{12}{y}$

E. $8+h$

18. Use the graph of the function to find the domain and range of *f*.



A. domain: all real numbers

range: $(-\infty, -2) \cup (-1, \infty)$

B. domain: $(-\infty, -2) \cup (-1, \infty)$

range: $(-\infty, -2) \cup (-2, \infty)$

C. domain: $(-\infty, -2) \cup (-2, \infty)$

range:

D. domain: all real numbers

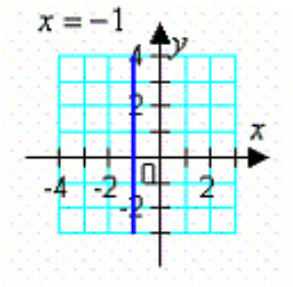
range: $(-\infty, -2] \cup [-1, \infty)$

E. domain: all real numbers

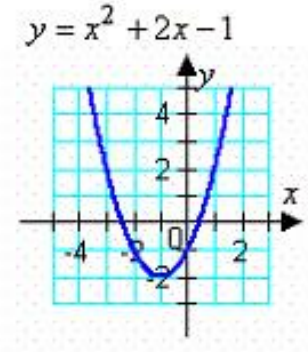
range: all real numbers

19. Use the Vertical Line Test to determine in which of the graphs y is **not** a function of x.

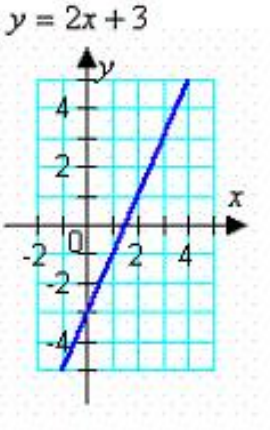
A. All of the choices (A, B, C, and D) represent functions.



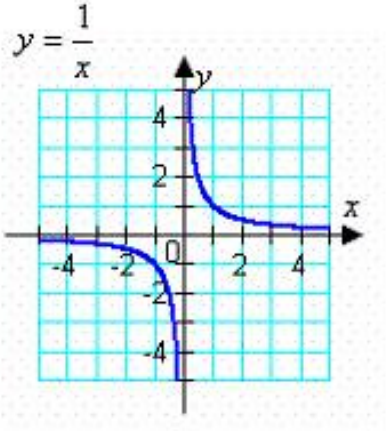
B.



C.



D.



E.

20. Find the zeroes of the functions algebraically.

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

$x = -2,\ x = 3,\ x = \dfrac{1}{6}$

A.

B. $x = 2,\ x = -3$

C. $x = -2,\ x = 3$

$x = \dfrac{1}{6}$

D.

$x = 2,\ x = -3,\ x = \dfrac{1}{6}$

E.

21. Find the zeroes of the functions algebraically.

$f(x) = \sqrt{-7x} - 2$

$x = \pm\dfrac{2}{7}$

A.

B. no real zeroes

$x = -\dfrac{2}{7}$

C.

$x = \pm\dfrac{4}{7}$

D.

$x = -\dfrac{4}{7}$

E.

22. Use a graphing utility to graph the function and find the zeroes of the function.

$f(x) = -5 - \frac{7}{x}$

A. $x = -\frac{7}{5}$

B. $x = \frac{7}{5}$

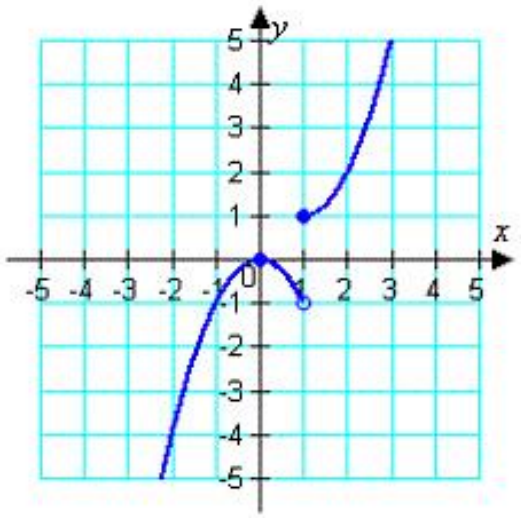
C. $x = -\frac{5}{7}$

D. no real zeroes

E. $x = \frac{5}{7}$

23. Determine the intervals over which the function is increasing, decreasing, or constant.

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



A. increasing on $(-\infty, 0)$
decreasing on $(0, \infty)$

B. increasing on $(-\infty, 0)$
decreasing on $(0, 1)$
increasing on $(1, \infty)$

C. decreasing on $(-\infty, 1)$
increasing on $(1, \infty)$

D. increasing on $(-\infty, 1)$
decreasing on $(1, \infty)$

E. decreasing on $(-\infty, 0)$
increasing on $(0, 1)$
increasing on $(1, \infty)$

24. Use a graphing utility to graph the function and visually determine the intervals over which the function is increasing, decreasing, or constant.

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

A. increasing on $(-\infty, \infty)$

B. decreasing on $(-\infty, -1)$

increasing on $(-1, 1)$

decreasing on $(1, \infty)$

C. decreasing on $(-\infty, 0)$

increasing on $(0, \infty)$

D. decreasing on $(-\infty, \infty)$

E. increasing on $(-\infty, -1)$

decreasing on $(-1, 1)$

increasing on $(1, \infty)$

25. Use a graphing utility to graph the function and approximate (to two decimal places) any relative minimum or relative maximum values.

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

A. relative maximum: $(-4.09, -0.18)$
relative minimum: $(-1.91, -1.82)$

B. relative maximum: $(-0.18, -4.09)$
relative minimum: $(-1.82, -1.91)$

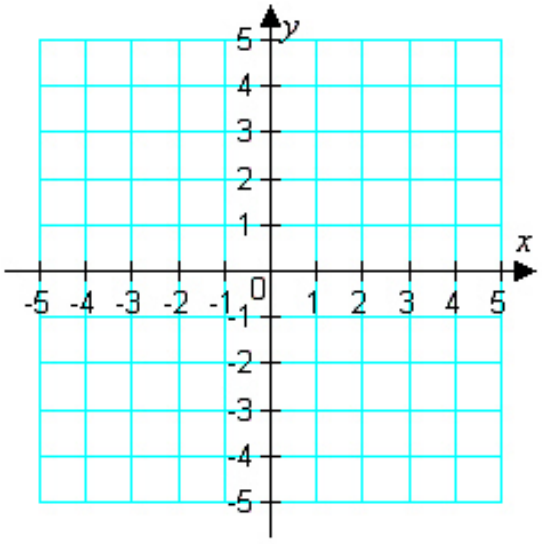
C. relative maximum: $(-1.82, -1.91)$
relative minimum: $(-0.18, -4.09)$

D. relative maximum: $(-1.91, -1.82)$
relative minimum: $(-4.09, -0.18)$

E. relative maximum: $(-4.09, -26.29)$
relative minimum: $(-1.91, -1.93)$

26. Graph the function and determine the interval(s) for which $f(x) \geq 0$.

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



A. $(-\infty, -4) \cup (0, \infty)$

B. $(-4, 0)$

C. $[-4, 0]$

D. $\{-4\}$

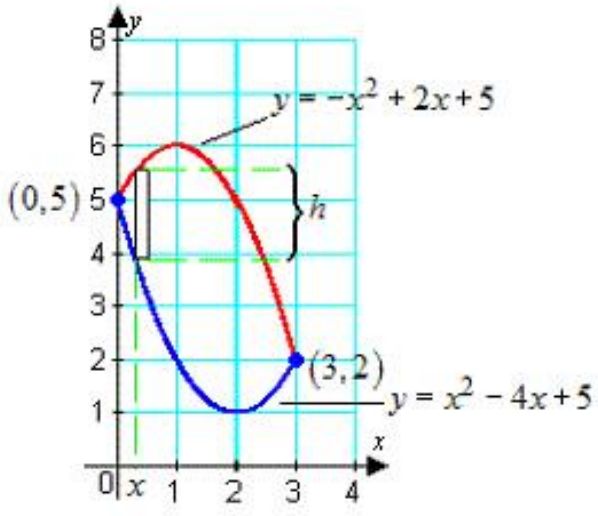
E. $(-\infty, -4] \cup [0, \infty)$

27. Determine whether the function is even, odd, or neither.

$f(x) = 7x^{\frac{3}{4}}$

A. neither
B. even
C. odd

28. Write the height h of the rectangle as a function of x.



A. $h(x) = -x^2 + 2x + 4$

B. $h(x) = -2x^2 + 6x$

C. $h(x) = -2x + 10$

D. $h(x) = -x^2 + 2x + 5$

E. $h(x) = 6x$

$$s = -16t^2 + v_0 t + s_0$$

29. Use the position equation to write a function that represents the situation and give the average velocity of the object from time t_1 to time t_2.

An object is thrown upward from a height of 174 feet at a velocity of 1 feet per second.

$t_1 = 1, \quad t_2 = 5$

A. $s = -16t^2 + 174t + 1;$ avg. velocity $= 157$ ft/s

B. $s = -16t^2 + 1t + 174;$ avg. velocity $= -16$ ft/s

C. $s = -16t^2 + 174t + 1;$ avg. velocity $= 78$ ft/s

D. $s = -16t^2 + 1t + 174;$ avg. velocity $= -95$ ft/s

E. $s = -16t^2 + 1t + 174;$ avg. velocity $= -380$ ft/s

30. Write the linear function *f* such that it has the indicated values.

$f(3) = -4, \qquad f(-8) = 2$

A. $y = \frac{10}{7}x + \frac{29}{5}$

B. $y = -\frac{11}{6}x + \frac{3}{2}$

C. $y = \frac{6}{11}x - \frac{62}{11}$

D. $y = -\frac{6}{11}x - \frac{26}{11}$

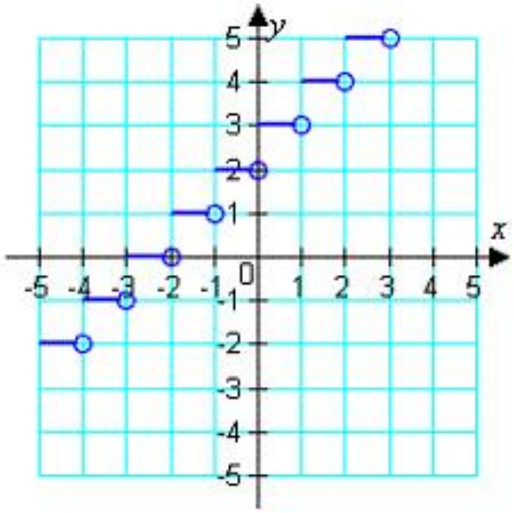
E. $y = \frac{7}{10}x - \frac{61}{10}$

31. Evaluate the function for the indicated values.

$f(x) = 4[\![x + 8]\!] + 8$

	(i) $f(5)$	(ii) $f(-52.7)$	(iii) $f\left(\frac{2}{3}\right)$
A.	(i) 60	(ii) -168	(iii) 44
B.	(i) 60	(ii) -168	(iii) 40
C.	(i) 61	(ii) -172	(iii) 44
D.	(i) 61	(ii) -172	(iii) 40
E.	(i) 60	(ii) -172	(iii) 40

32. Which function does the graph represent?



A. $g(x) = [\![3x]\!]$

B. $g(x) = [\![x + 3]\!]$

C. $g(x) = 3[\![x]\!]$

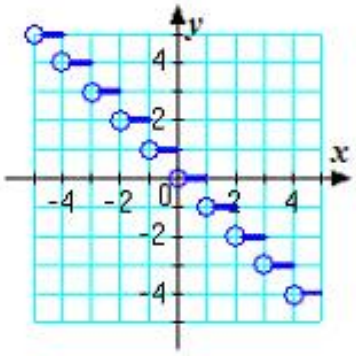
D. $g(x) = [\![\frac{x}{3}]\!]$

E. $g(x) = [\![x - 3]\!]$

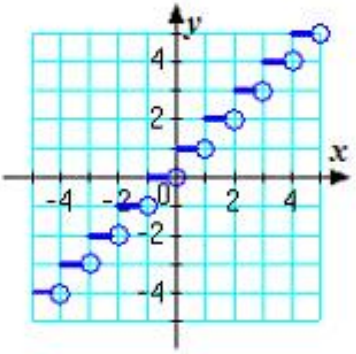
33. Which graph represents the function?

$g(x) = [\![x - 1]\!]$

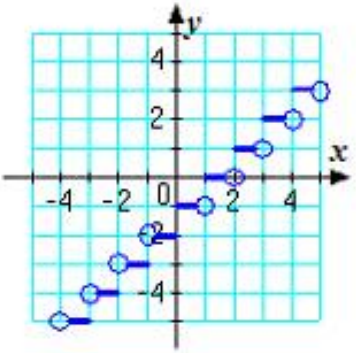
A.



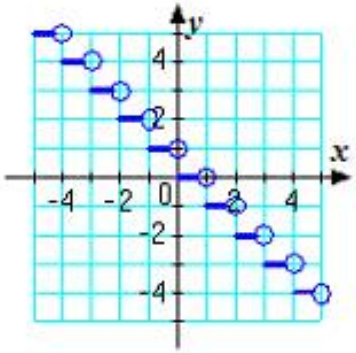
B.



C.



D.



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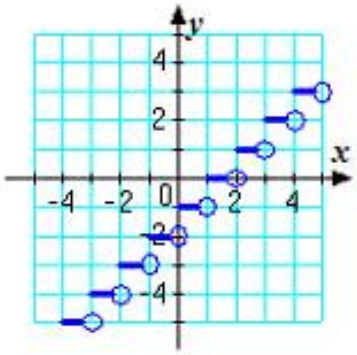
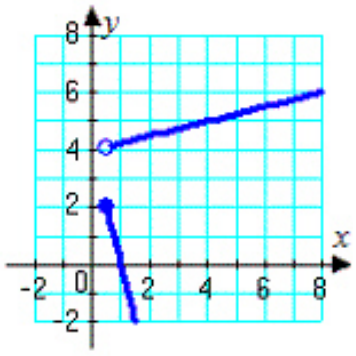


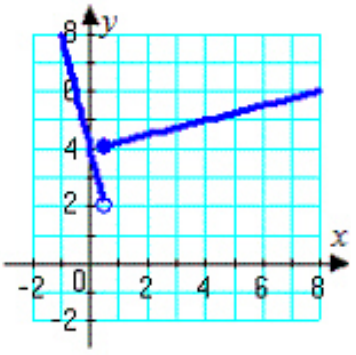
34. Which graph represents the function?

$$f(x) = \begin{cases} \frac{x}{4} + 4, & x < \frac{1}{2} \\ 4 - 4x, & x \geq \frac{1}{2} \end{cases}$$

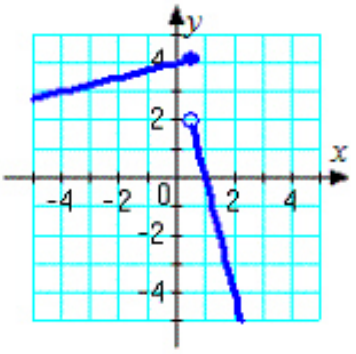
A.



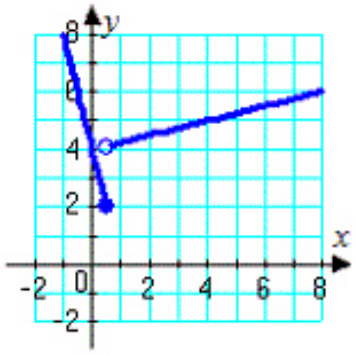
B.

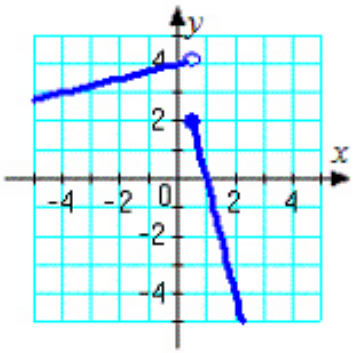


C.



D.

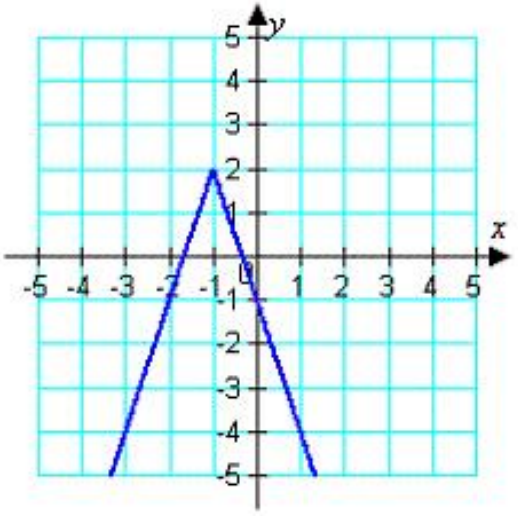




E.

35. Use the graph of
$f(x) = |x|$

to write an equation for the function whose graph is shown.



A. $f(x) = -3|x - 1| + 2$

B. $f(x) = -3|x + 1| + 2$

C. $f(x) = |-3x + 1| + 2$

D. $f(x) = -3|x + 1| - 2$

E. $f(x) = |-3x - 1| + 2$

36. Describe the sequence of transformations from the related common function $f(x) = x^3$ to *g*.

$g(x) = 4(x - 4)^3$

A. vertical shift 4 units up; then vertical shrink by a factor of 4
B. horizontal shift 4 units left; then vertical shrink by a factor of 4
C. horizontal shift 4 units right; then vertical stretch by a factor of 4
D. vertical shift 4 units down; then vertical shrink by a factor of 4
E. horizontal shift 4 units left; then vertical stretch by a factor of 4

37. Write an equation for the function that is described by the following characteristics:

the shape of $f(x) = x^2$, but moved eight units down, two units to the left, and then reflected in the *x*-axis

A. $g(x) = 2 - (x + 8)^2$

B. $g(x) = -(x + 2)^2 - 8$

C. $g(x) = 8 - (x + 2)^2$

D. $g(x) = -(x + 8)^2 - 2$

E. $g(x) = 8 - (x - 2)^2$

38. Write an equation for the function that is described by the following characteristics:

the shape of $f(x) = [\![x]\!]$, but reflected in the *y*-axis, moved five units down

A. $g(x) = [\![-x]\!] + 5$

B. $g(x) = -[\![x - 5]\!]$

C. $g(x) = -[\![x + 5]\!]$

D. $g(x) = [\![-x]\!] - 5$

E. $g(x) = -[\![x]\!] + 5$

39. Find ($f + g$)(x).

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

$g(x) = 4x^2 - 2x + 9$

A. ($f + g$)(x) = $-2x^4 - 2$

B. ($f + g$)(x) = $-6x^2 + 4x - 16$

C. ($f + g$)(x) = $6x^4 - 4x^2 + 16$

D. ($f + g$)(x) = $-2x^2 - 2$

E. ($f + g$)(x) = $6x^2 - 4x + 16$

40. Find (f / g)(x).

$f(x) = x^2 + 7x \qquad g(x) = -2 - x$

$$(f/g)(x) = \frac{x^2 + 7x}{-2 - x}, x \neq 0$$

A.

$$(f/g)(x) = \frac{x + 7}{-2}, x \neq 0$$

B.

$$(f/g)(x) = -\frac{x^2}{2} - 7, x \neq 0$$

C.

$$(f/g)(x) = \frac{x^2 + 7x}{-2 - x}, x \neq -2$$

D.

$$(f/g)(x) = \frac{x^2 + 7x}{-2 - x}, x \neq 2$$

E.

41. Find (*fg*)(*x*).

$f(x) = \sqrt{-2x}$ $\quad g(x) = \sqrt{-9x-1}$

$(fg)(x) = \sqrt{-11x-1}$

A.

$(fg)(x) = \sqrt{18x^2-1}$

B.

$(fg)(x) = \sqrt{18x^2+2x}$

C.

$(fg)(x) = 3x\sqrt{2}+\sqrt{2x}$

D.

$(fg)(x) = 3x\sqrt{2+2x}$

E.

42. Find (*f* - *g*)(*x*).

$f(x) = -\dfrac{9x}{7x-2}$ $\quad g(x) = -\dfrac{4}{x}$

$(f-g)(x) = \dfrac{-9x+30}{7x-2}$

A.

$(f-g)(x) = \dfrac{-9x^2+28x+8}{7x^2-2x}$

B.

$(f-g)(x) = \dfrac{-9x+4}{6x-2}$

C.

$(f-g)(x) = \dfrac{-9x^2+28x-8}{7x^2-2x}$

D.

$(f-g)(x) = \dfrac{-9x+26}{7x-2}$

E.

43. Evaluate the indicated function for $f(x) = x^2 - 7$ and $g(x) = x + 3$.
$(f - g)(t + 2)$

A. $t^2 + 3t - 2$
B. $t^2 + 3t - 8$
C. $t^2 + 5t - 8$
D. $t^2 - t - 8$
E. $t^2 + 5t - 2$

44. Evaluate the indicated function for $f(x) = x^2 - 3$ and $g(x) = x + 7$.
(*fg*)(1)
A. 12
B. –32
C. –20
D. –16
E. –30

45. Find $g \circ f$.
$f(x) = x - 3$ $g(x) = x^2$

A. $(g \circ f)(x) = x^2 - 6x + 9$

B. $(g \circ f)(x) = x^2 - 9$

C. $(g \circ f)(x) = x^2 - 3x + 9$

D. $(g \circ f)(x) = x^2 - 3$

E. $(g \circ f)(x) = x^2 + 9$

46. Find $f \circ g$.

$f(x) = -2x+7 \qquad g(x) = x+2$

A. $(f \circ g)(x) = -2x+3$

B. $(f \circ g)(x) = -3x+5$

C. $(f \circ g)(x) = -2x^2+3x+14$

D. $(f \circ g)(x) = -3x+9$

E. $(f \circ g)(x) = -2x+9$

47. Find $f \circ g$.

$f(x) = x+5 \qquad g(x) = \dfrac{9}{x^2-25}$

A. $(f \circ g)(x) = \dfrac{9}{x^2}$

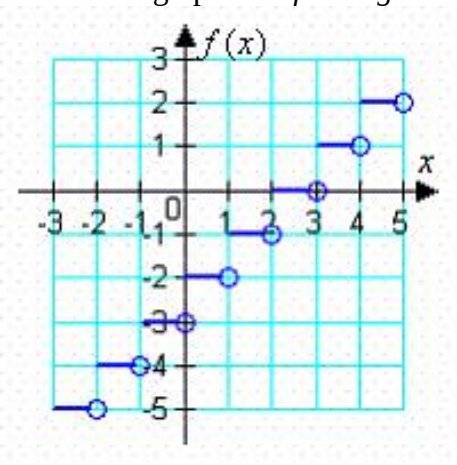
B. $(f \circ g)(x) = \dfrac{14}{x^2-25}$

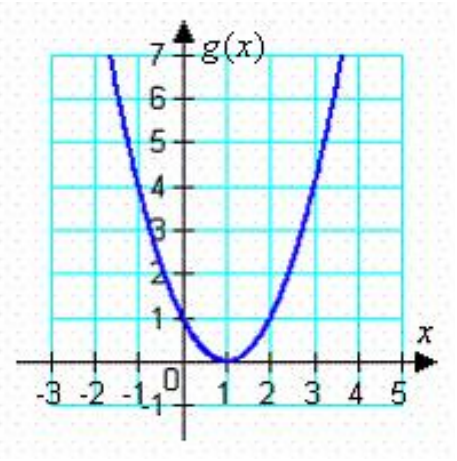
C. $(f \circ g)(x) = \dfrac{5x^2+4}{x^2-25}$

D. $(f \circ g)(x) = \dfrac{9}{x^2+10x}$

E. $(f \circ g)(x) = \dfrac{5x^2-116}{x^2-25}$

48. Use the graphs of f and g to evaluate the function.





$(f \circ g)(1)$

A. 9
B. –1
C. 0
D. –4
E. –2

49. The monthly cost C of running the machinery in a factory for t hours is given by $C(t) = 10t + 450$.
The number of hours t needed to produce x products is given by $t(x) = 8x$.
Find the equation representing the cost C of manufacturing x products.

A. $C(x) = 18x + 460$
B. $C(x) = 80x + 4500$
C. $C(x) = 10x + 458$
D. $C(x) = 18x + 450$
E. $C(x) = 80x + 450$

50. Find the inverse function of f.

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

A. $f^{-1}(x) = \sqrt[5]{x} - 2$
B. $f^{-1}(x) = \sqrt[5]{x} + 2$
C. $f^{-1}(x) = -\sqrt[5]{x} + 2$
D. $f^{-1}(x) = -\sqrt[5]{x+2}$
E. $f^{-1}(x) = \sqrt[5]{x-2}$

51. Show algebraically that f and g are inverse functions.

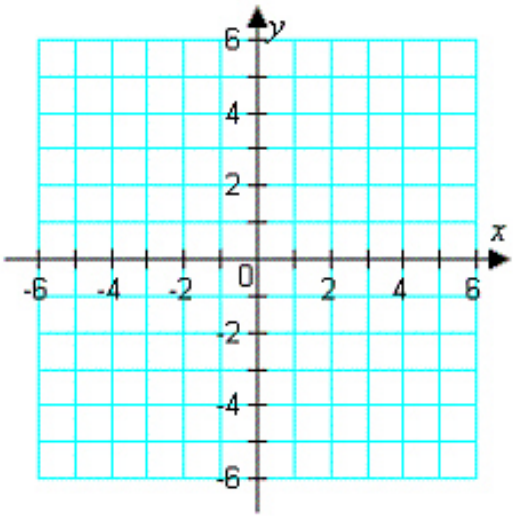
$f(x) = 9x - 8$ $\qquad g(x) = \dfrac{x+8}{9}$

52. Show algebraically that f and g are inverse functions.

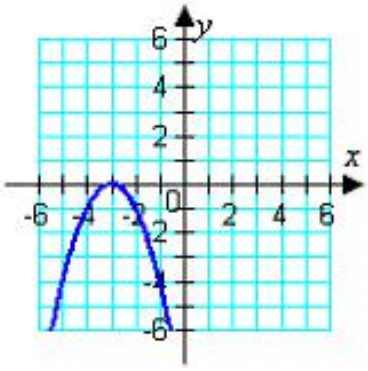
$f(x) = \sqrt{x-4},\ x \geq 4$ $\qquad g(x) = x^2 + 4,\ x \geq 0$

53. Graph the given function.

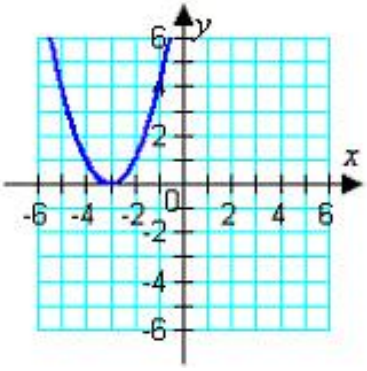
$f(x) = (x+3)^2$



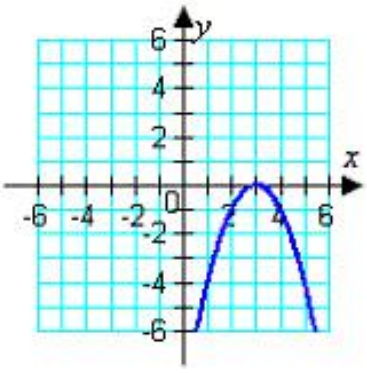
A.



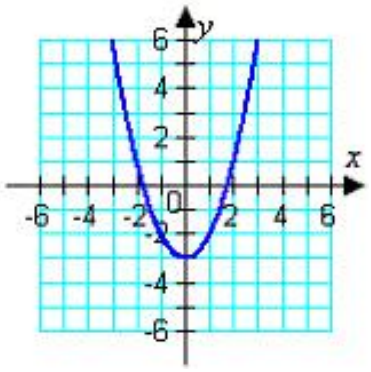
B.



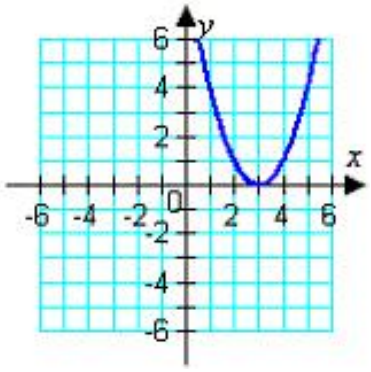
C.



D.



E.



54. Find the inverse function of f.

$f(x) = \frac{2x+5}{7x+6}, x \neq -\frac{6}{7}$

$f^{-1}(x) = -\frac{7x+6}{2x+5}, x \neq -\frac{5}{2}$

A.

$f^{-1}(x) = \frac{7x+6}{2x+5}, x \neq -\frac{5}{2}$

B.

$f^{-1}(x) = \frac{7x-2}{-6x+5}, x \neq -\frac{6}{5}$

C.

$f^{-1}(x) = \frac{-6x+5}{7x-2}, x \neq \frac{2}{7}$

D.

$f^{-1}(x) = \frac{6x-5}{7x-2}, x \neq \frac{2}{7}$

E.

55. Determine whether the function has an inverse function. If it does, find the inverse function.

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

A. $f^{-1}(x) = \sqrt{x} + 6, x \geq 0$

B. $f^{-1}(x) = \sqrt{x - 6}$

C. $f^{-1}(x) = \sqrt{x} - 6$

D. No inverse function exists.

E. $f^{-1}(x) = \sqrt{x+6}, x \geq -6$

56. Determine whether the function has an inverse function. If it does, find the inverse function.

$$f(x) = \begin{cases} 4x+5, & x < -3 \\ (x+3)^2 - 7, & x \geq -3 \end{cases}$$

A. $$f^{-1}(x) = \begin{cases} \frac{x-5}{4}, & x < -3 \\ \sqrt{x+7} - 3, & x \geq -3 \end{cases}$$

B. No inverse function exists.

C. $$f^{-1}(x) = \begin{cases} \frac{x-5}{4}, & x < -7 \\ \sqrt{x+7} - 3, & x \geq -7 \end{cases}$$

D. $$f^{-1}(x) = \begin{cases} \frac{x+5}{4}, & x < -7 \\ \sqrt{x+7} - 3, & x \geq -7 \end{cases}$$

E. $$f^{-1}(x) = \begin{cases} \frac{x-5}{4}, & x < -3 \\ \sqrt{x+4}, & x \geq -3 \end{cases}$$

57. Use the functions given by $f(x)=\frac{x}{8}+1$ and $g(x)=x^3$ to find the indicated value.

$(f \circ g)^{-1}(5)$

A. $\frac{637}{512}$

B. $3\sqrt[3]{2}$

C. $2\sqrt[3]{5-1}$

D. undefined

E. $2\sqrt[3]{6}$

Lar_AT_8e_Ch02 Key

1. Write the slope-intercept form of the equation of the line through the given point perpendicular to the given line.

point: (–7, –8) line: $-9x - 45y = 9$

A. $y = \frac{1}{9}x - \frac{65}{9}$

B. $y = 5x - \frac{43}{5}$

C. $y = 5x + 27$

D. $y = -9x + 55$

E. $y = -\frac{1}{5}x - \frac{47}{5}$

2. Gretel's Computer Repair Store purchases a network server for $1145. The machine has a useful life of 5 years after which time another one will have to be purchased. Assume depreciation of the machine is linear. Write a linear equation giving the value V of the network server during the 5 years it will be in use.

A. $V = -\frac{1}{229}t - 1145$

B. $V = 229t - 1145$

C. $V = -\frac{1}{229}t + 5$

D. $V = \frac{1}{229}t + 5$

E. $V = -229t + 1145$

3. Does the table describe a function?

Input value	2001	2002	2003	2004	2005
Output value	30	60	30	50	40

A. no
B. yes

4. Does the table describe a function?

Input value	10	30	10	20	40
Output value	2001	2002	2003	2004	2005

A. yes
B. no

5. Does the table describe a function?

Input value	1	3	4	3	1
Output value	–12	–7	0	7	12

A. yes
B. no

6. Does the table describe a function?

Input value	–4	–2	0	2	4
Output value	7	7	7	7	7

A. no
B. yes

7. Which set of ordered pairs represents a function from P to Q?
$P = \{5, 10, 15, 20\}$ $Q = \{-3, -1, 1\}$

A. $\{(5, 1), (15, -1), (5, -3), (15, 1)\}$

B. $\{(15, -3), (15, -1), (15, 1)\}$

C. $\{(5, -3), (10, -1), (10, 1), (15, -1), (20, -3)\}$

D. $\{(15, -1), (10, -3), (5, -1), (10, 1), (15, -3)\}$

E. $\{(10, -1), (15, 1), (20, -1)\}$

8. Which equation does not represent *y* as a function of *x*?

A. $2x = -9y$

B. $-4y = -9$

C. $6x^2 + 7y = -2$

D. $-9x + 7y = -9$

E. $-5y^2 + 7x = 3$

9. Which equation does not represent *y* as a function of *x*?

A. $y = \sqrt{8+x}$

B. $y = \left|-8+9x^2\right|$

C. $x = -6y+5$

D. $x = -1$

E. $y = 7x+9$

10. Evaluate the function at the specified value of the independent variable and simplify.

$q(y) = -6y-5$

$q(0.2)$

A. 3.8

B. $-1.2y+30$

C. $0.2y+5$

D. $0.2y-5$

E. –6.2

11. Evaluate the function at the specified value of the independent variable and simplify.

$$g(w) = \begin{cases} 2w, & w \le -1 \\ 2w^2 + 2w, & -1 \le w \le 1 \\ 2w^3 + 2w^2, & w > 1 \end{cases}$$

$g\left(\frac{1}{4}\right)$

A. $\frac{1}{5}$

B. $\frac{1}{2}$

C. $\frac{5}{32}$

D. $\frac{1}{16}$

E. $\frac{5}{8}$

12. Find all real values of x such that $f(x) = 0$.

$$f(x) = \frac{-6x - 9}{2}$$

A. $-\frac{3}{2}$

B. $-\frac{3}{4}$

C. $\pm\frac{3}{2}$

D. $\frac{3}{2}$

E. $\pm\frac{3}{4}$

13. Find all real values of x such that $f(x) = 0$.

$f(x) = 81x^2 - 49$

A. $\pm\frac{9}{7}$

B. $\pm\frac{7}{9}$

C. $-\frac{49}{81}$

D. $\frac{7}{9}$

E. $\pm\frac{49}{81}$

14. Find the value(s) of x for which $f(x) = g(x)$.

$f(x) = x^2 + 7x + 33$ $\quad g(x) = -6x - 9$

A. $-6, -7$

B. $6, 7$

C. $33, 7, -\frac{3}{2}$

D. $33, 26, -\frac{3}{2}$

E. $-40, -\frac{3}{2}$

15. Find the domain of the function.

$q(s) = \frac{8s}{s-6}$

A. $s = 6, s = 0$

B. $s = 6$

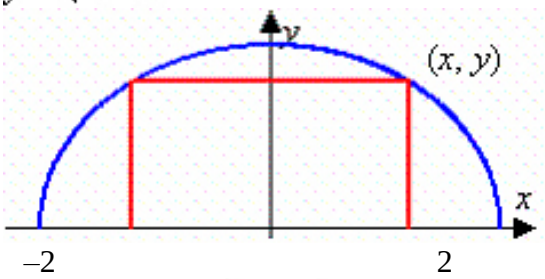
C. all real numbers $s \neq 6, s \neq 0$

D. all real numbers

E. all real numbers $s \neq 6$

16. A rectangle is bounded by the *x*-axis and the semicircle $y=\sqrt{4-x^2}$ (see figure). Write the area *A* of the rectangle as a function of *x* and determine the domain of the function.

$y=\sqrt{4-x^2}$



A. $A(x)=2|x|\sqrt{4-x^2}, \quad -2\le x\le 2$

B. $A(x)=2x\sqrt{4-x^2}, \quad -2\le x\le 2$

C. $A(x)=x\sqrt{4-x^2}, \quad x\ge 0$

D. $A(x)=2x\sqrt{4-x^2}, \quad x\ge 0$

E. $A(x)=|x|\sqrt{4-x^2}, \quad$ all real numbers

17. Find the difference quotient and simplify your answer.

$f(y) = -4y^2+6y, \quad \dfrac{f(1+h)-f(1)}{h}, \; h \ne 0$

A. $-2-4h$

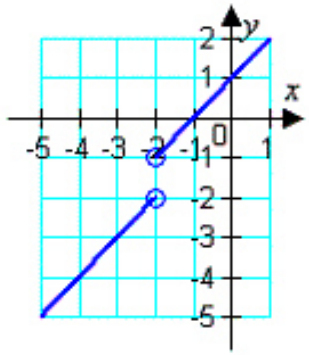
B. $6-4y+\dfrac{12}{y}$

C. $6-4h$

D. $-2-4y+\dfrac{12}{y}$

E. $8+h$

18. Use the graph of the function to find the domain and range of *f*.



A. domain: all real numbers

range: $(-\infty, -2) \cup (-1, \infty)$

B. domain: $(-\infty, -2) \cup (-1, \infty)$

range: $(-\infty, -2) \cup (-2, \infty)$

C. domain: $(-\infty, -2) \cup (-2, \infty)$

range:

D. domain: all real numbers

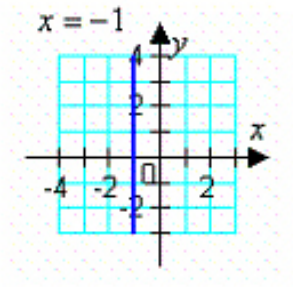
range: $(-\infty, -2] \cup [-1, \infty)$

E. domain: all real numbers

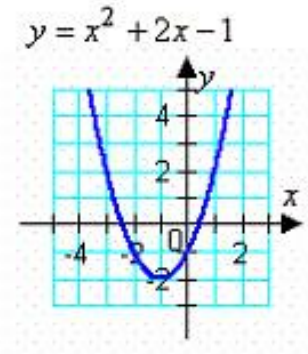
range: all real numbers

19. Use the Vertical Line Test to determine in which of the graphs y is **not** a function of x.

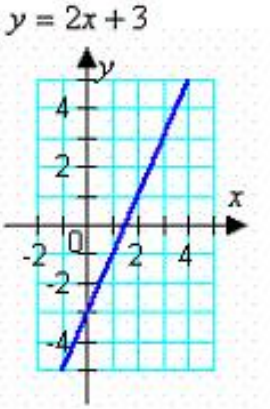
A. All of the choices (A, B, C, and D) represent functions.



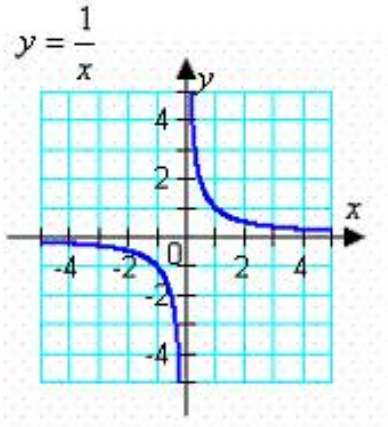
B.



C.



D.



E.

20. Find the zeroes of the functions algebraically.

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

A. $x = -2, x = 3, x = \dfrac{1}{6}$

B. $x = 2, x = -3$

C. $x = -2, x = 3$

$x = \dfrac{1}{6}$

D. $x = 2, x = -3, x = \dfrac{1}{6}$

E.

21. Find the zeroes of the functions algebraically.

$f(x) = \sqrt{-7x} - 2$

A. $x = \pm\dfrac{2}{7}$

B. no real zeroes

C. $x = -\dfrac{2}{7}$

D. $x = \pm\dfrac{4}{7}$

E. $x = -\dfrac{4}{7}$

22. Use a graphing utility to graph the function and find the zeroes of the function.

$f(x) = -5 - \frac{7}{x}$

A. $x = -\frac{7}{5}$

B. $x = \frac{7}{5}$

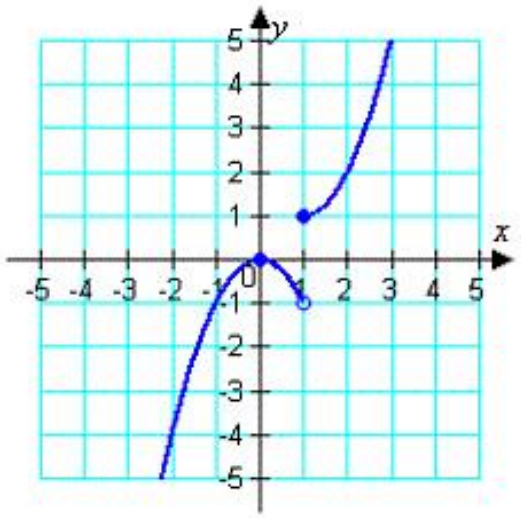
C. $x = -\frac{5}{7}$

D. no real zeroes

E. $x = \frac{5}{7}$

23. Determine the intervals over which the function is increasing, decreasing, or constant.

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



increasing on $(-\infty, 0)$

A. decreasing on $(0, \infty)$

increasing on $(-\infty, 0)$

decreasing on $(0, 1)$

B. increasing on $(1, \infty)$

decreasing on $(-\infty, 1)$

C. increasing on $(1, \infty)$

increasing on $(-\infty, 1)$

D. decreasing on $(1, \infty)$

decreasing on $(-\infty, 0)$

increasing on $(0, 1)$

E. increasing on $(1, \infty)$

24. Use a graphing utility to graph the function and visually determine the intervals over which the function is increasing, decreasing, or constant.

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

A. increasing on $(-\infty, \infty)$

B. decreasing on $(-\infty, -1)$

increasing on $(-1, 1)$

decreasing on $(1, \infty)$

C. decreasing on $(-\infty, 0)$

increasing on $(0, \infty)$

D. decreasing on $(-\infty, \infty)$

E. increasing on $(-\infty, -1)$

decreasing on $(-1, 1)$

increasing on $(1, \infty)$

25. Use a graphing utility to graph the function and approximate (to two decimal places) any relative minimum or relative maximum values.

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

A. relative maximum: $(-4.09, -0.18)$
relative minimum: $(-1.91, -1.82)$

B. relative maximum: $(-0.18, -4.09)$
relative minimum: $(-1.82, -1.91)$

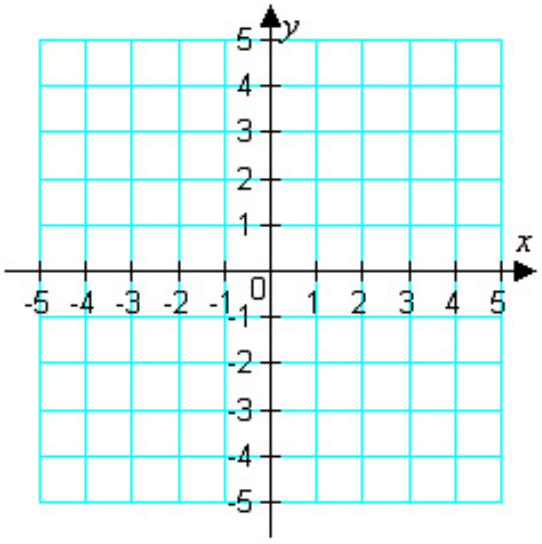
C. relative maximum: $(-1.82, -1.91)$
relative minimum: $(-0.18, -4.09)$

D. relative maximum: $(-1.91, -1.82)$
relative minimum: $(-4.09, -0.18)$

E. relative maximum: $(-4.09, -26.29)$
relative minimum: $(-1.91, -1.93)$

26. Graph the function and determine the interval(s) for which $f(x) \geq 0$.

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



A. $(-\infty, -4) \cup (0, \infty)$

B. $(-4, 0)$

C. $[-4, 0]$

D. $\{-4\}$

E. $(-\infty, -4] \cup [0, \infty)$

27. Determine whether the function is even, odd, or neither.

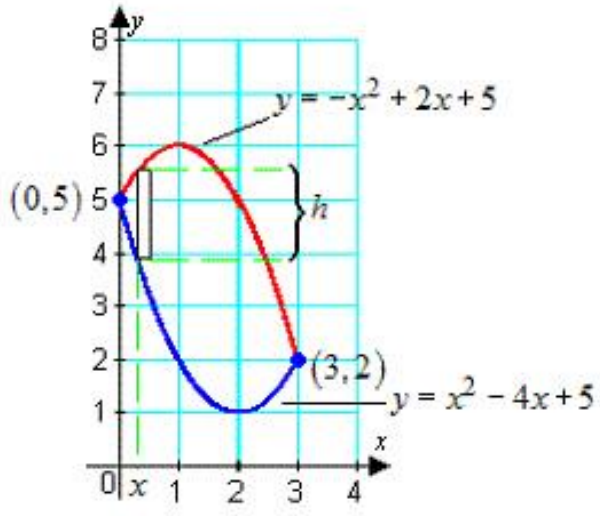
$f(x) = 7x^{\frac{3}{4}}$

A. neither

B. even

C. odd

28. Write the height h of the rectangle as a function of x.



A. $h(x) = -x^2 + 2x + 4$

B. $h(x) = -2x^2 + 6x$

C. $h(x) = -2x + 10$

D. $h(x) = -x^2 + 2x + 5$

E. $h(x) = 6x$

$$s = -16t^2 + v_0t + s_0$$

29. Use the position equation to write a function that represents the situation and give the average velocity of the object from time t_1 to time t_2.
An object is thrown upward from a height of 174 feet at a velocity of 1 feet per second.
$t_1 = 1, \quad t_2 = 5$

A. $s = -16t^2 + 174t + 1;$ avg. velocity $= 157$ ft/s

B. $s = -16t^2 + 1t + 174;$ avg. velocity $= -16$ ft/s

C. $s = -16t^2 + 174t + 1;$ avg. velocity $= 78$ ft/s

D. $s = -16t^2 + 1t + 174;$ avg. velocity $= -95$ ft/s

E. $s = -16t^2 + 1t + 174;$ avg. velocity $= -380$ ft/s

30. Write the linear function f such that it has the indicated values.

$f(3) = -4, \qquad f(-8) = 2$

A. $y = \frac{10}{7}x + \frac{29}{5}$

B. $y = -\frac{11}{6}x + \frac{3}{2}$

C. $y = \frac{6}{11}x - \frac{62}{11}$

D. $y = -\frac{6}{11}x - \frac{26}{11}$

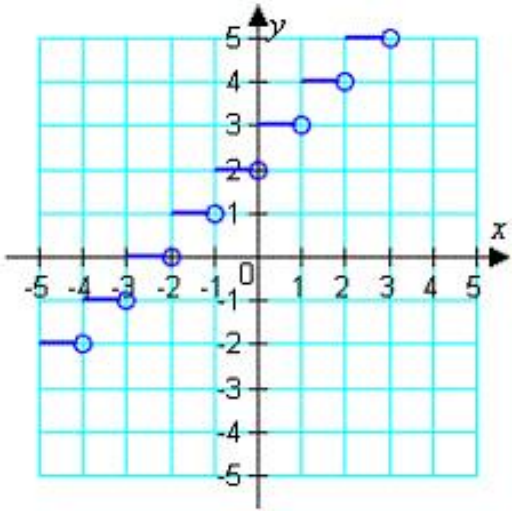
E. $y = \frac{7}{10}x - \frac{61}{10}$

31. Evaluate the function for the indicated values.

$f(x) = 4[\![x + 8]\!] + 8$

	(i) $f(5)$	(ii) $f(-52.7)$	(iii) $f\left(\frac{2}{3}\right)$
A.	(i) 60	(ii) -168	(iii) 44
B.	(i) 60	(ii) -168	(iii) 40
C.	(i) 61	(ii) -172	(iii) 44
D.	(i) 61	(ii) -172	(iii) 40
E.	(i) 60	(ii) -172	(iii) 40

32. Which function does the graph represent?



A. $g(x) = [\![3x]\!]$

$g(x) = [\![x + 3]\!]$

B.

C. $g(x) = 3[\![x]\!]$

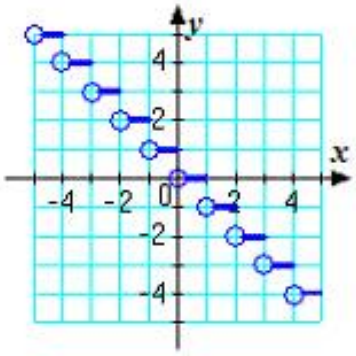
D. $g(x) = [\![\frac{x}{3}]\!]$

E. $g(x) = [\![x - 3]\!]$

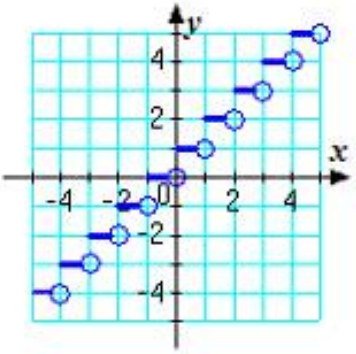
33. Which graph represents the function?

$g(x) = [\![x - 1]\!]$

A.



B.



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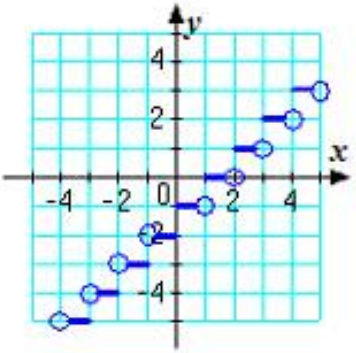
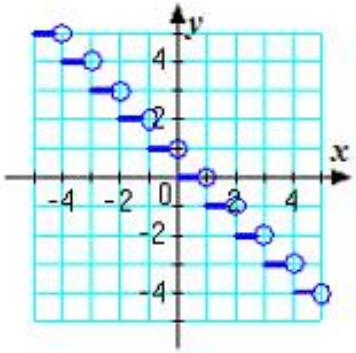
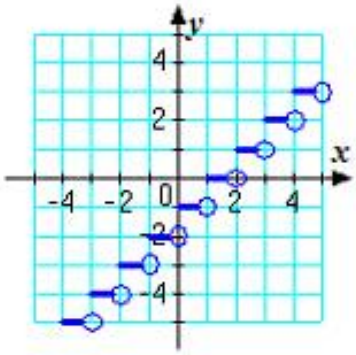


D.



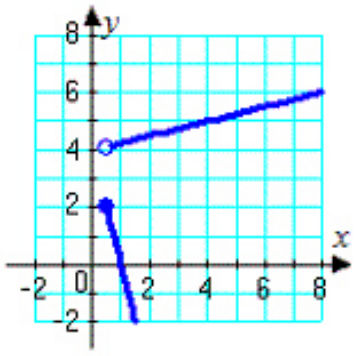


E.

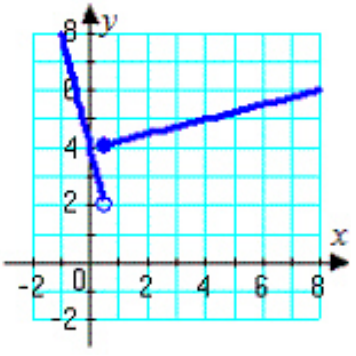
34. Which graph represents the function?

$$f(x) = \begin{cases} \frac{x}{4} + 4, & x < \frac{1}{2} \\ 4 - 4x, & x \geq \frac{1}{2} \end{cases}$$

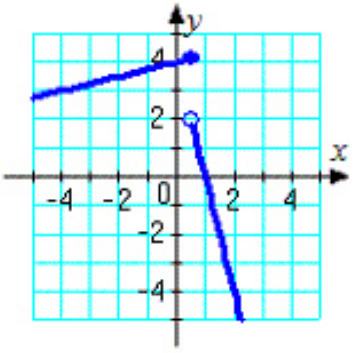
A.



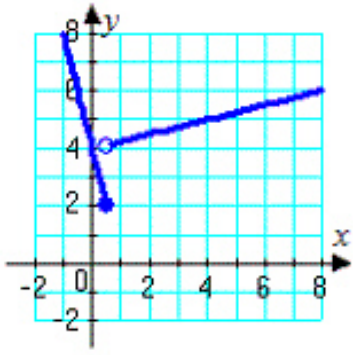
B.

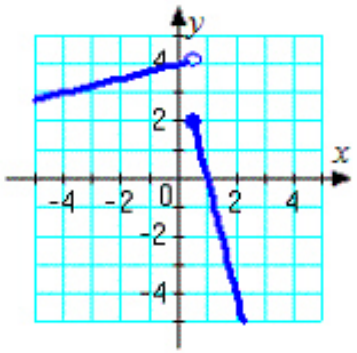


C.



D.

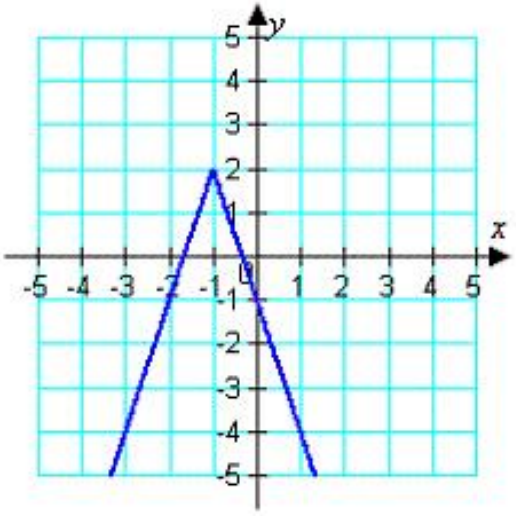




E.

35. Use the graph of
$f(x) = |x|$

to write an equation for the function whose graph is shown.



A. $f(x) = -3|x - 1| + 2$

B. $f(x) = -3|x + 1| + 2$

C. $f(x) = |-3x + 1| + 2$

D. $f(x) = -3|x + 1| - 2$

E. $f(x) = |-3x - 1| + 2$

36. Describe the sequence of transformations from the related common function $f(x) = x^3$ to *g*.

$g(x) = 4(x - 4)^3$

A. vertical shift 4 units up; then vertical shrink by a factor of 4
B. horizontal shift 4 units left; then vertical shrink by a factor of 4
C. horizontal shift 4 units right; then vertical stretch by a factor of 4
D. vertical shift 4 units down; then vertical shrink by a factor of 4
E. horizontal shift 4 units left; then vertical stretch by a factor of 4

37. Write an equation for the function that is described by the following characteristics:

the shape of $f(x) = x^2$, but moved eight units down, two units to the left, and then reflected in the *x*-axis

A. $g(x) = 2 - (x + 8)^2$
B. $g(x) = -(x + 2)^2 - 8$
C. $g(x) = 8 - (x + 2)^2$
D. $g(x) = -(x + 8)^2 - 2$
E. $g(x) = 8 - (x - 2)^2$

38. Write an equation for the function that is described by the following characteristics:

the shape of $f(x) = [\![x]\!]$, but reflected in the *y*-axis, moved five units down

A. $g(x) = [\![-x]\!] + 5$
B. $g(x) = -[\![x - 5]\!]$
C. $g(x) = -[\![x + 5]\!]$
D. $g(x) = [\![-x]\!] - 5$
E. $g(x) = -[\![x]\!] + 5$

39. Find ($f + g$)(x).

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

$g(x) = 4x^2 - 2x + 9$

A. ($f + g$)(x) = $-2x^4 - 2$

B. ($f + g$)(x) = $-6x^2 + 4x - 16$

C. ($f + g$)(x) = $6x^4 - 4x^2 + 16$

D. ($f + g$)(x) = $-2x^2 - 2$

E. ($f + g$)(x) = $6x^2 - 4x + 16$

40. Find (f / g)(x).

$f(x) = x^2 + 7x \qquad g(x) = -2 - x$

$$(f/g)(x) = \frac{x^2 + 7x}{-2 - x}, x \neq 0$$

A.

$$(f/g)(x) = \frac{x + 7}{-2}, x \neq 0$$

B.

$$(f/g)(x) = -\frac{x^2}{2} - 7, x \neq 0$$

C.

$$(f/g)(x) = \frac{x^2 + 7x}{-2 - x}, x \neq -2$$

D.

$$(f/g)(x) = \frac{x^2 + 7x}{-2 - x}, x \neq 2$$

E.

41. Find (*fg*)(*x*).

$f(x) = \sqrt{-2x}$ $\quad g(x) = \sqrt{-9x-1}$

$(fg)(x) = \sqrt{-11x-1}$

A.

$(fg)(x) = \sqrt{18x^2-1}$

B.

$(fg)(x) = \sqrt{18x^2+2x}$

C.

$(fg)(x) = 3x\sqrt{2}+\sqrt{2x}$

D.

$(fg)(x) = 3x\sqrt{2+2x}$

E.

42. Find (*f* - *g*)(*x*).

$f(x) = -\dfrac{9x}{7x-2}$ $\quad g(x) = -\dfrac{4}{x}$

$(f-g)(x) = \dfrac{-9x+30}{7x-2}$

A.

$(f-g)(x) = \dfrac{-9x^2+28x+8}{7x^2-2x}$

B.

$(f-g)(x) = \dfrac{-9x+4}{6x-2}$

C.

$(f-g)(x) = \dfrac{-9x^2+28x-8}{7x^2-2x}$

D.

$(f-g)(x) = \dfrac{-9x+26}{7x-2}$

E.

43. Evaluate the indicated function for $f(x) = x^2 - 7$ and $g(x) = x + 3$.
$(f - g)(t + 2)$

A. $t^2 + 3t - 2$

B. $t^2 + 3t - 8$

C. $t^2 + 5t - 8$

D. $t^2 - t - 8$

E. $t^2 + 5t - 2$

44. Evaluate the indicated function for $f(x) = x^2 - 3$ and $g(x) = x + 7$.
(*fg*)(1)

A. 12

B. –32

C. –20

D. –16

E. –30

45. Find $g \circ f$.
$f(x) = x - 3$ $g(x) = x^2$

A. $(g \circ f)(x) = x^2 - 6x + 9$

B. $(g \circ f)(x) = x^2 - 9$

C. $(g \circ f)(x) = x^2 - 3x + 9$

D. $(g \circ f)(x) = x^2 - 3$

E. $(g \circ f)(x) = x^2 + 9$

46. Find $f \circ g$.

$f(x) = -2x+7 \qquad g(x) = x+2$

A. $(f \circ g)(x) = -2x+3$

B. $(f \circ g)(x) = -3x+5$

C. $(f \circ g)(x) = -2x^2+3x+14$

D. $(f \circ g)(x) = -3x+9$

E. $(f \circ g)(x) = -2x+9$

47. Find $f \circ g$.

$f(x) = x+5 \qquad g(x) = \dfrac{9}{x^2-25}$

A. $(f \circ g)(x) = \dfrac{9}{x^2}$

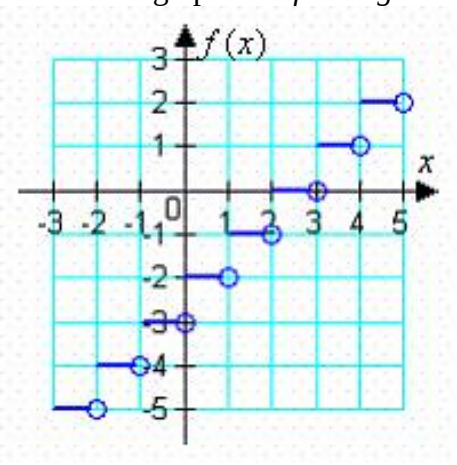
B. $(f \circ g)(x) = \dfrac{14}{x^2-25}$

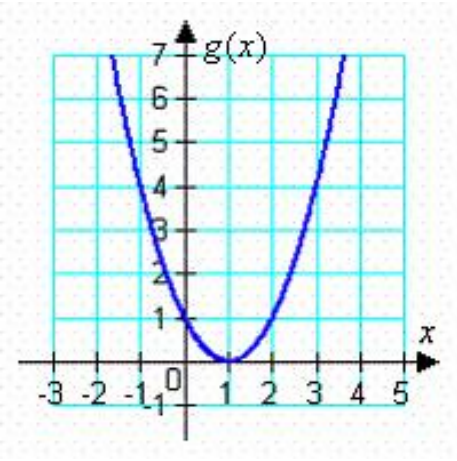
C. $(f \circ g)(x) = \dfrac{5x^2+4}{x^2-25}$

D. $(f \circ g)(x) = \dfrac{9}{x^2+10x}$

E. $(f \circ g)(x) = \dfrac{5x^2-116}{x^2-25}$

48. Use the graphs of f and g to evaluate the function.





$(f \circ g)(1)$

A. 9
B. –1
C. 0
D. –4
E. –2

49. The monthly cost C of running the machinery in a factory for t hours is given by $C(t) = 10t + 450$.
The number of hours t needed to produce x products is given by $t(x) = 8x$.
Find the equation representing the cost C of manufacturing x products.

A. $C(x) = 18x + 460$
B. $C(x) = 80x + 4500$
C. $C(x) = 10x + 458$
D. $C(x) = 18x + 450$
E. $C(x) = 80x + 450$

50. Find the inverse function of f.

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

A. $f^{-1}(x) = \sqrt[5]{x} - 2$
B. $f^{-1}(x) = \sqrt[5]{x} + 2$
C. $f^{-1}(x) = -\sqrt[5]{x} + 2$
D. $f^{-1}(x) = -\sqrt[5]{x+2}$
E. $f^{-1}(x) = \sqrt[5]{x-2}$

51. Show algebraically that *f* and *g* are inverse functions.

$f(x) = 9x - 8 \qquad g(x) = \dfrac{x+8}{9}$

$$f\left(g(x)\right) = f\left(\frac{x+8}{9}\right) = 9\left(\frac{x+8}{9}\right) - 8 = x + 8 - 8 = x$$

$$g\left(f(x)\right) = g(9x-8) = \frac{9x-8+8}{9} = \frac{9x}{9} = x$$

52. Show algebraically that *f* and *g* are inverse functions.

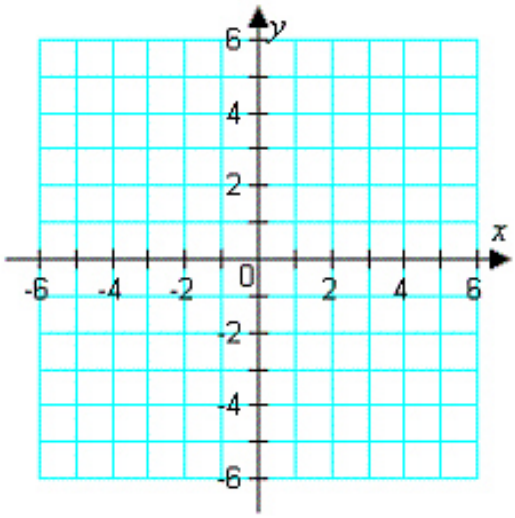
$f(x) = \sqrt{x-4},\ x \geq 4 \qquad g(x) = x^2 + 4,\ x \geq 0$

$$f\left(g(x)\right) = f\left(x^2+4\right) = \sqrt{\left(x^2+4\right)-4} = \sqrt{x^2} = x$$

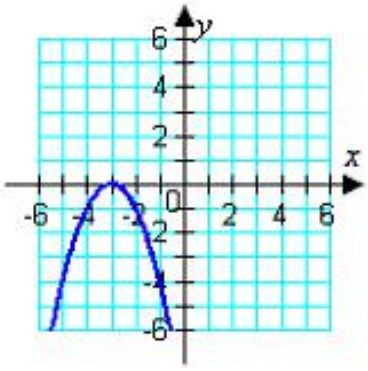
$$g\left(f(x)\right) = g\left(\sqrt{x-4}\right) = \left(\sqrt{x-4}\right)^2 + 4 = x - 4 + 4 = x$$

53. Graph the given function.

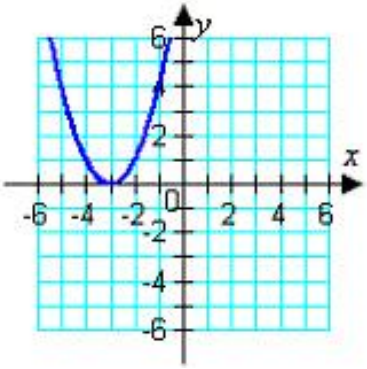
$f(x) = (x+3)^2$



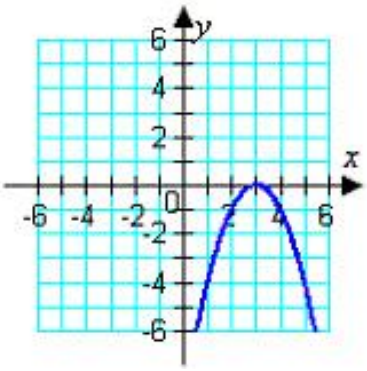
A.



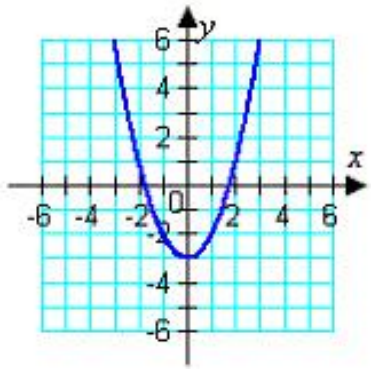
B.



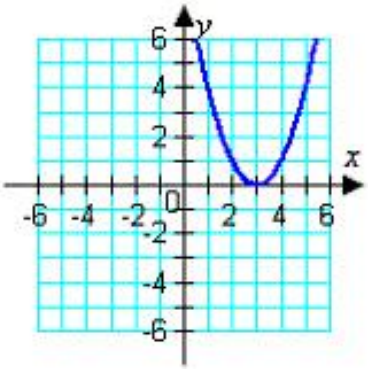
C.



D.



E.



54. Find the inverse function of f.

$f(x) = \frac{2x+5}{7x+6}, x \neq -\frac{6}{7}$

A. $f^{-1}(x) = -\frac{7x+6}{2x+5}, x \neq -\frac{5}{2}$

B. $f^{-1}(x) = \frac{7x+6}{2x+5}, x \neq -\frac{5}{2}$

C. $f^{-1}(x) = \frac{7x-2}{-6x+5}, x \neq -\frac{6}{5}$

D. $f^{-1}(x) = \frac{-6x+5}{7x-2}, x \neq \frac{2}{7}$

E. $f^{-1}(x) = \frac{6x-5}{7x-2}, x \neq \frac{2}{7}$

55. Determine whether the function has an inverse function. If it does, find the inverse function.

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

A. $f^{-1}(x) = \sqrt{x} + 6, x \geq 0$

B. $f^{-1}(x) = \sqrt{x - 6}$

C. $f^{-1}(x) = \sqrt{x} - 6$

D. No inverse function exists.

E. $f^{-1}(x) = \sqrt{x+6}, x \geq -6$

56. Determine whether the function has an inverse function. If it does, find the inverse function.

$$f(x) = \begin{cases} 4x+5, & x < -3 \\ (x+3)^2 - 7, & x \geq -3 \end{cases}$$

A. $$f^{-1}(x) = \begin{cases} \dfrac{x-5}{4}, & x < -3 \\ \sqrt{x+7} - 3, & x \geq -3 \end{cases}$$

B. No inverse function exists.

C. $$f^{-1}(x) = \begin{cases} \dfrac{x-5}{4}, & x < -7 \\ \sqrt{x+7} - 3, & x \geq -7 \end{cases}$$

D. $$f^{-1}(x) = \begin{cases} \dfrac{x+5}{4}, & x < -7 \\ \sqrt{x+7} - 3, & x \geq -7 \end{cases}$$

E. $$f^{-1}(x) = \begin{cases} \dfrac{x-5}{4}, & x < -3 \\ \sqrt{x+4}, & x \geq -3 \end{cases}$$

57. Use the functions given by $f(x)=\frac{x}{8}+1$ and $g(x)=x^3$ to find the indicated value.

$(f \circ g)^{-1}(5)$

A. $\frac{637}{512}$

B. $3\sqrt[3]{2}$

C. $2\sqrt[3]{5-1}$

D. undefined

E. $2\sqrt[3]{6}$