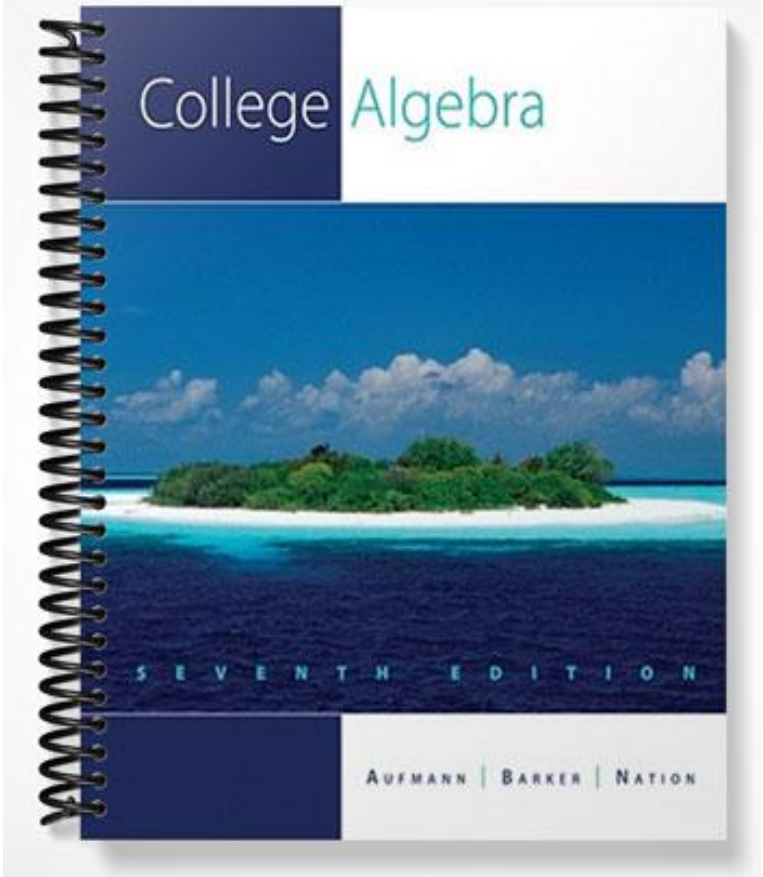
TEST BANK

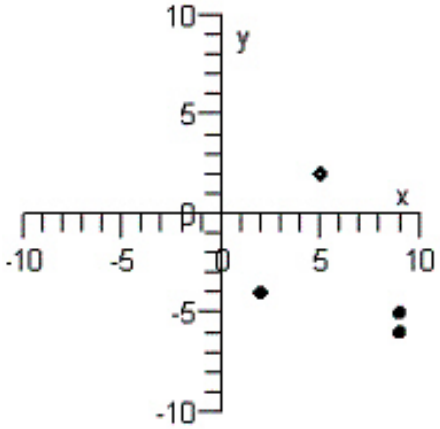


Chapter 2--Functions and Graphs

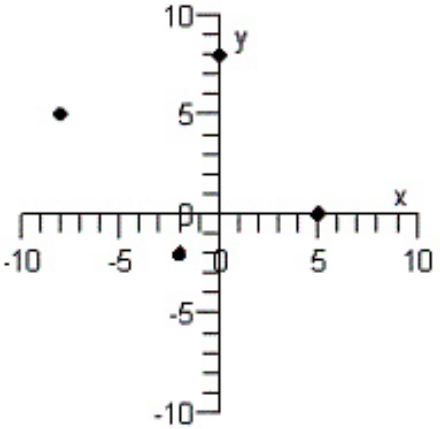
Student: _____

1. Plot the points below whose coordinates are given on a Cartesian coordinate system.
(5, 2), (9, – 6), (2, – 4), (9, – 5)

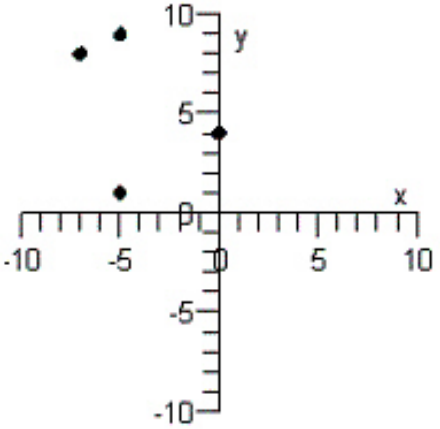
A.



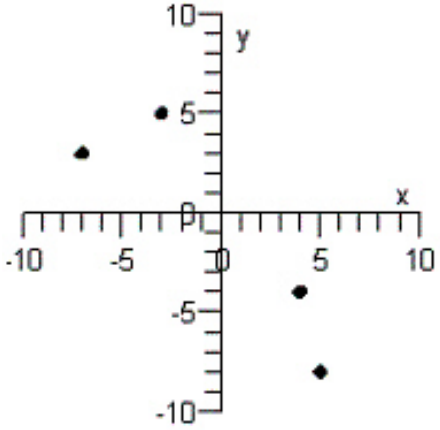
B.

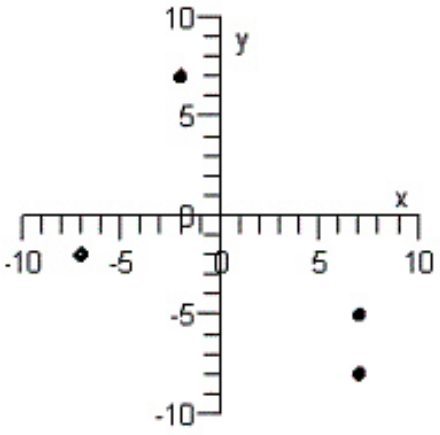


C.



D.



E. 

2. Find the distance between the two points $(3, -1)$ and $(3, 2)$.

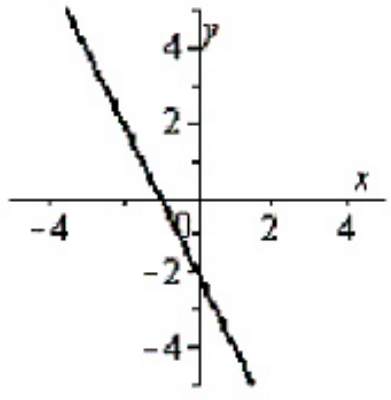
A. 6
B. 1
C. 5
D. 7
E. 3

3. Find the midpoint between the two points $(11, -5)$ and $(-7, -3)$.

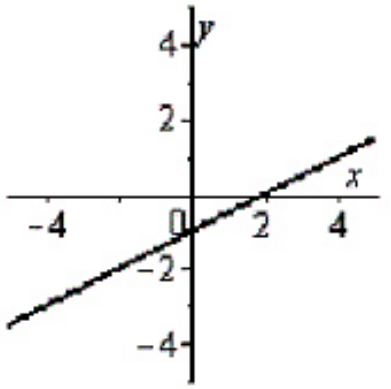
A. $(9, 1)$
B. $(4, -4)$
C. $(9, -4)$
D. $(2, -4)$
E. $(2, 1)$

4. Graph the following equation by plotting points that satisfy the equation.
$x + 2y = 1$

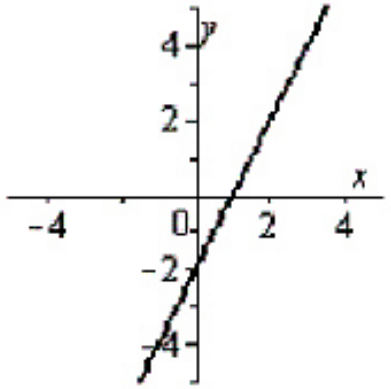
A.



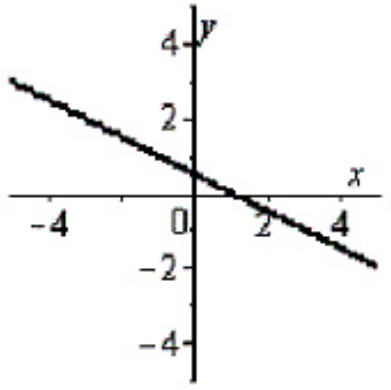
B.



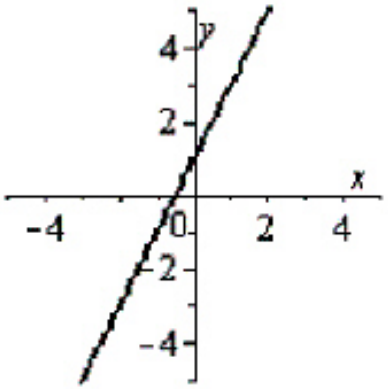
C.



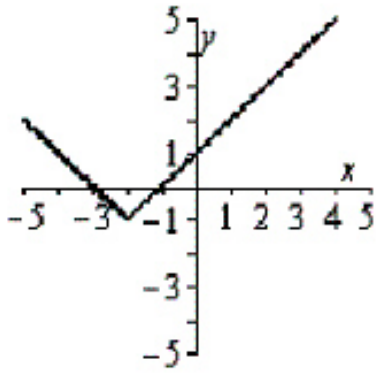
D.



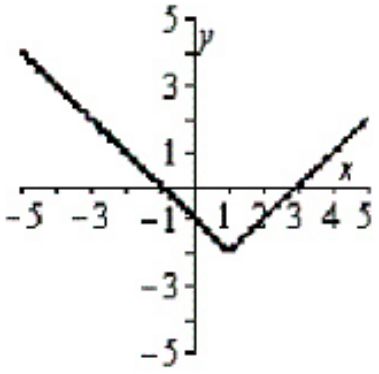
E.



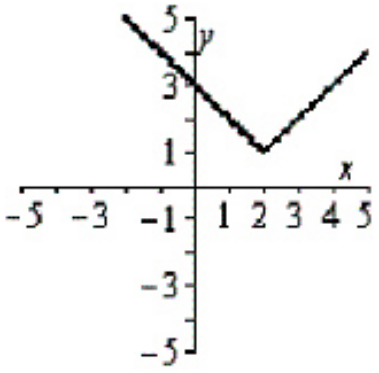
5. Graph the following equation by plotting points that satisfy the equation.
$y = |x - 2| + 1$



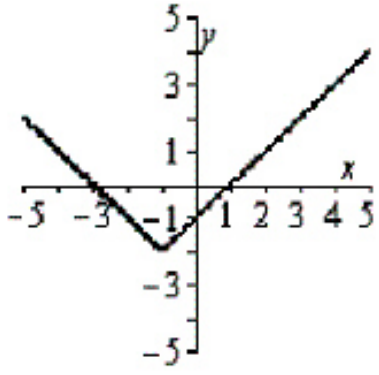
A.



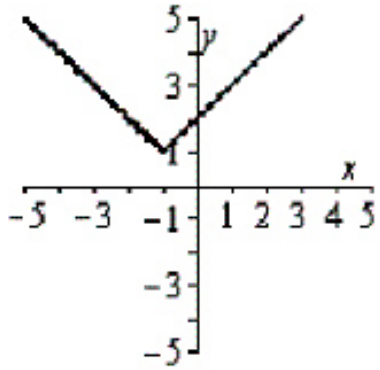
B.



C.



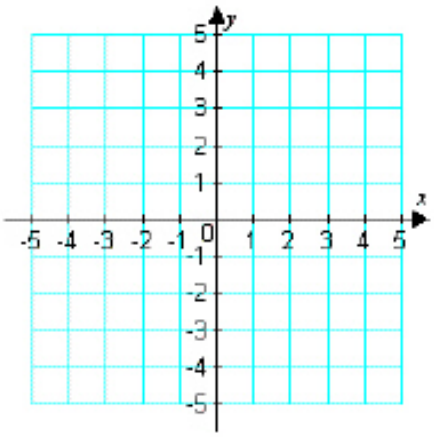
D.



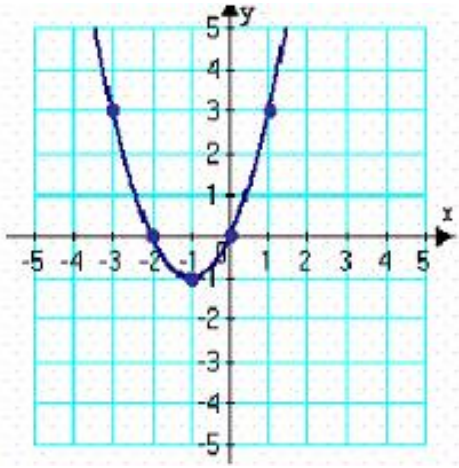
E.

6. Create and complete a table to find the x and y coordinates of points that lie on the graph of the equation below. Plot at least 5 points along with the graph of the equation.

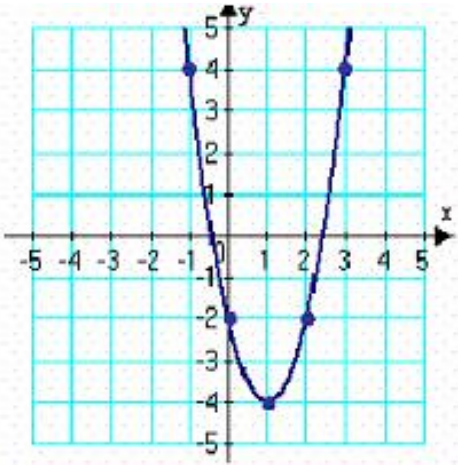
$y = x^2 + 4x$



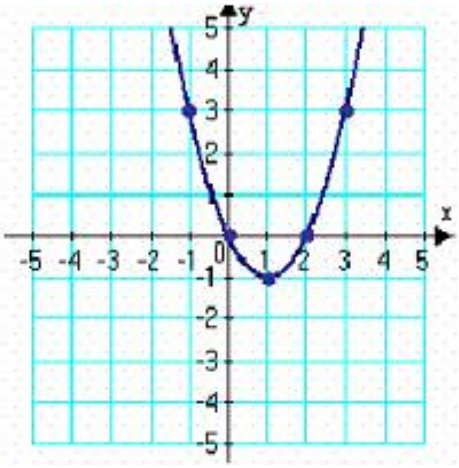
A.



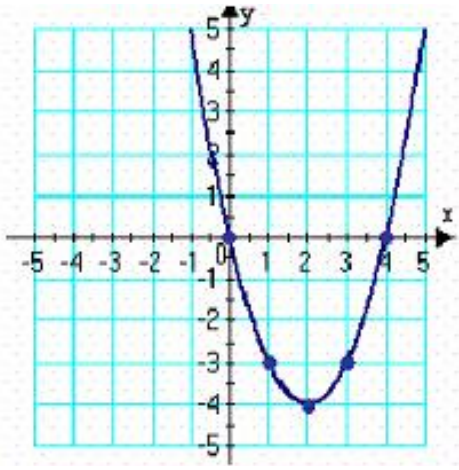
B.



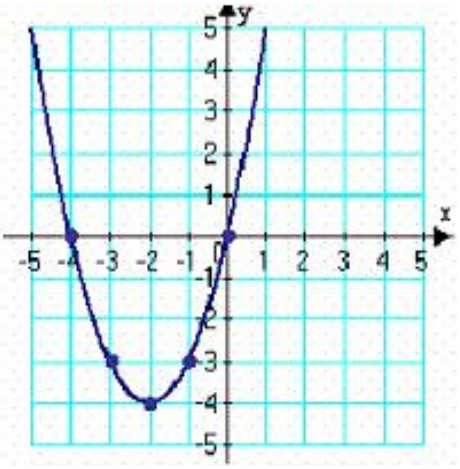
C.


y
x
5
4
3
2
1
-1
-2
-3
-4
-5
-5 -4 -3 -2 -1 0 1 2 3 4 5

D.


y
x
5
4
3
1
-1
-2
-3
-4
-5
-5 -4 -3 -2 -1 0 1 2 3 4 5

E.


y
x
5
4
3
2
1
-1
-2
-3
-4
-5
-5 -4 -3 -2 -1 0 1 2 3 4 5

7. Find the x- and y-intercepts of the graph of the following equation.

$-9x + 11y = -4$

A. x-int: $\left(-\frac{9}{11}, 0\right)$; y-int: $\left(0, -\frac{11}{9}\right)$

B. x-int: $\left(\frac{4}{9}, 0\right)$; y-int: $\left(0, -\frac{4}{11}\right)$

C. x-int: $\left(-\frac{9}{11}, 0\right)$; y-int: $\left(0, -\frac{4}{11}\right)$

D. x-int: $\left(\frac{4}{9}, 0\right)$; y-int: $\left(0, -\frac{11}{9}\right)$

E. x-int: $\left(\frac{9}{4}, 0\right)$; y-int: $\left(0, -\frac{9}{11}\right)$

8. Determine the center and radius of the circle with the following equation.

$(x-1)^2 + (y+2)^2 = 225$

A. center: $(1, -2)$; radius: 15

B. center: $(-1, 2)$; radius: $\frac{15}{2}$

C. center: $\left(-\frac{1}{15}, \frac{2}{15}\right)$; radius: 1

D. center: $(1, -2)$; radius: 225

E. center: $(-1, 2)$; radius: 15

9. Find an equation of a circle that satisfies the following condition. Write your answer in standard form.
Center: $(-2, -6)$; passing through $(4, 5)$

$(x+2)^2+(y+6)^2=\left(\sqrt{157}\right)^2$

A.

$(x+2)^2+(y+6)^2=\left(\sqrt{41}\right)^2$

B.

$(x-4)^2+(y-5)^2=\left(\sqrt{41}\right)^2$

C.

$(x-4)^2+(y-5)^2=\left(\sqrt{157}\right)^2$

D.

$(x-2)^2+(y-6)^2=\left(\sqrt{157}\right)^2$

E.

10. Find the center and radius of the graph of the circle. The equation of the circle is written in general form.
$x^2+y^2+6x-4y-23=0$

A. center: $(-6, 4)$; radius: 6
B. center: $(-3, 2)$; radius: 6
C. center: $(3, -2)$; radius: $\sqrt{23}$
D. center: $(-6, 4)$; radius: $\sqrt{23}$
E. center: $(3, -2)$; radius: 6

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

A. $y = 7x+6$
B. $x = -6y-2$
C. $y = \left|-4+5x^2\right|$
D. $y = \sqrt{5+8x}$
E. $x = -5$

12. Which set of ordered pairs represents a function from *P* to *Q*?
$P = \{5, 10, 15, 20\}$ $Q = \{-2, 0, 2\}$

A. $\{(15,-2),(15,0),(15,2)\}$

B. $\{(5,-2),(10,0),(10,2),(15,0),(20,-2)\}$

C. $\{(10,0),(15,2),(20,0)\}$

D. $\{(5,2),(15,0),(5,-2),(15,2)\}$

E. $\{(15,0),(10,-2),(5,0),(10,2),(15,-2)\}$

13. Given $p(x) = 3x^2 - 9$, find $p(6)$.

A. 27
B. 99
C. 9
D. 117
E. 108

14. Given $m(x) = 6x^2 + 2$, find $m(-1)$.

A. 4
B. 6
C. –4
D. 8
E. –10

15. Given $p(x) = 7x^2 + 6$, find $p(0)$.

A. 14
B. 8
C. 20
D. 13
E. 6

16. Given $t(x) = 2x^2 - 1$, find $t\left(\frac{2}{3}\right)$.

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

B. $-\frac{1}{9}$

C. $\frac{1}{3}$

D. $\frac{5}{9}$

E. $\frac{5}{3}$

17. Given $q(x) = 3x^2 + 3$, find $q(u)$.

A. $9u^2 + 3$

B. $3u^2 + 3u$

C. $6u^2$

D. $9u^2 + 9$

E. $3u^2 + 3$

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

$f(w) = \dfrac{-2w}{5w-2}$

$f(t-8)$

A. $\dfrac{-2w+16}{5w-42}$

B. $\dfrac{-2t+16}{5t-42}$

C. $-\dfrac{8}{21}$

D. $\dfrac{8}{19}$

E. $\dfrac{-2t-16}{5t-42}$

19. Given $r(x) = \dfrac{x}{x-3}$, find $r(-9)$.

A. 1

B. $\dfrac{4}{3}$

C. $\dfrac{3}{4}$

D. –12

E. –2

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

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

$g\left(\frac{3}{5}\right)$

A. $\frac{6}{5}$

B. $-\frac{81}{125}$

C. $-\frac{27}{25}$

D. $\frac{27}{20}$

E. $-\frac{27}{125}$

21. Determine the domain of the following function.

$f(x) = 2x - 5$

A. all real numbers

B. $\left\{x \middle| -\frac{2}{5} < x < \frac{2}{5}\right\}$

C. $\left\{x \middle| x > -\frac{5}{2}\right\}$

D. $\left\{x \middle| x > -\frac{2}{5}\right\}$

E. $\left\{x \middle| x \le -\frac{5}{2}\right\}$

22. Find the domain of the function.

$q(s) = \sqrt{81 - s^2}$

A. all real numbers
B. $s \geq 0$
C. $-9 \leq s \leq 9$
D. $s \leq -9 \text{ or } s \geq 9$
E. $s \leq 9$

23. Use the floor function to write an expression that can be used to round 3.5579 to the nearest thousandths.

$$\frac{\text{int}\left(10^3(3.5579)\right)}{10^3}$$

A.
$$\frac{\text{int}\left(10^3(3.5579)+0.5\right)}{10^3}$$

B.
$$\frac{\text{int}\left(10^2(3.5579)\right)}{10^2}$$

C.
$$\frac{\text{int}\left(10(3.5579)+0.5\right)}{10}$$

D.
$$\frac{\text{int}\left(10^2(3.5579)+0.5\right)}{10^2}$$

E.

24. The amount of federal income tax $T(x)$ an individual owed in 2003 is given by

$$T(x) = \begin{cases} 0.10x & \text{if } 0 \le x < 7000 \\ 0.15(x - 7000) + 700 & \text{if } 7000 \le x < 28400 \\ 0.25(x - 28400) + 3910 & \text{if } 28400 \le x < 68800 \\ 0.28(x - 68800) + 14010 & \text{if } 68800 \le x < 143500 \\ 0.33(x - 143500) + 34926 & \text{if } 143500 \le x < 311950 \\ 0.33(x - 311950) + 90515 & \text{if } x \ge 311950 \end{cases}$$

where *x* is the adjusted gross income tax of the taxpayer. What is the domain of this function? Write answer in interval notation.

A. $[0, \infty)$
B. $[0, 311950]$
C. $(-\infty, \infty)$
D. $[7000, 311950]$
E. $(0, 311950)$

25. The amount of federal income tax $T(x)$ an individual owed in 2003 is given by

$$T(x) = \begin{cases} 0.10x & \text{if } 0 \le x < 7,000 \\ 0.15(x - 7,000) + 700 & \text{if } 7,000 \le x < 28,400 \\ 0.25(x - 28,400) + 3,910 & \text{if } 28,400 \le x < 68,800 \\ 0.28(x - 68,800) + 14,010 & \text{if } 68,800 \le x < 143,500 \\ 0.33(x - 143,500) + 34,926 & \text{if } 143,500 \le x < 311,950 \\ 0.33(x - 311,950) + 90,515 & \text{if } x \ge 311,950 \end{cases}$$

where *x* is the adjusted gross income tax of the taxpayer. Find the income tax owed by an individual whose adjusted gross income was $46,200.

A. $4,450.00
B. $6,580.00
C. $7,071.00
D. $8,360.00
E. $8,894.00

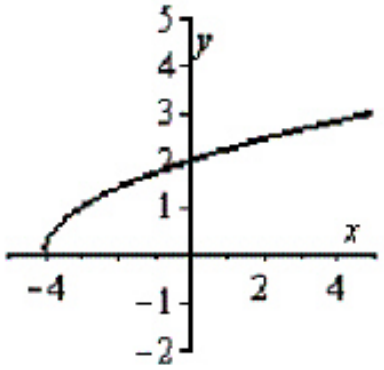
26. The amount of federal income tax $T(x)$ an individual owed in [$year] is given by

$$T(x) = \begin{cases} 0.10x & \text{if } 0 \le x < 7,300 \\ 0.15(x - 7,300) + 730 & \text{if } 7,300 \le x < 29,700 \\ 0.25(x - 29,700) + 4,090 & \text{if } 29,700 \le x < 71,950 \\ 0.28(x - 71,950) + 14,626 & \text{if } 71,950 \le x < 150,150 \\ 0.33(x - 150,150) + 36,549 & \text{if } 150,150 \le x < 326,450 \\ 0.33(x - 326,450) + 94,728 & \text{if } x \ge 326,450 \end{cases}$$

where x is the adjusted gross income tax of the taxpayer. Find the income tax owed by an individual whose adjusted gross income was $99,450.

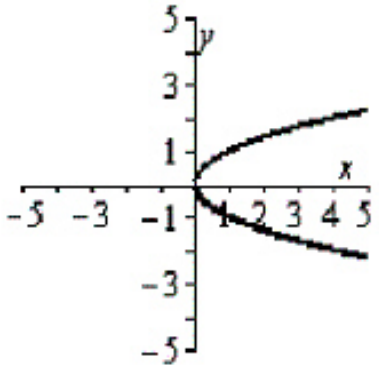
A. $21,501
B. $17,836
C. $19,818
D. $22,326
E. $7,700

27. Use the vertical line test to determine if the following graph is the graph of a function.



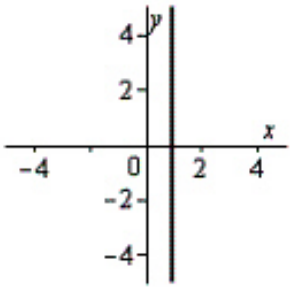
A. function
B. not a function

28. Use the vertical line test to determine if the following graph is the graph of a function.



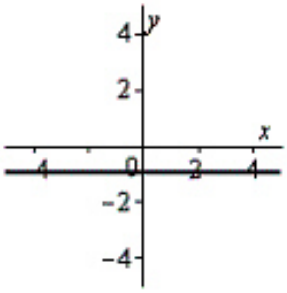
A. not a function
B. function

29. Use the vertical line test to determine if the following graph is the graph of a function.



A. function
B. not a Function

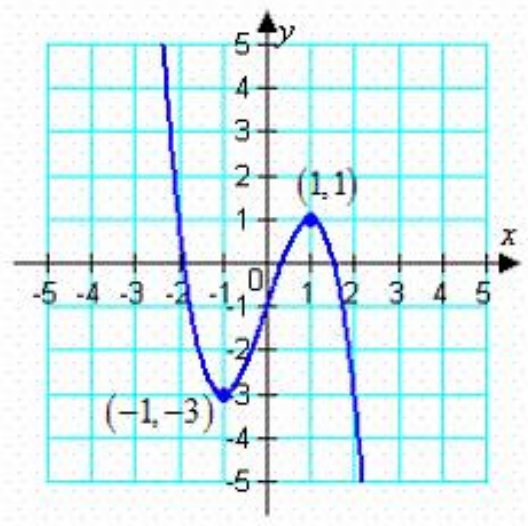
30. Use the vertical line test to determine if the following graph is the graph of a function.



A. not a function
B. function

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

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



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

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

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

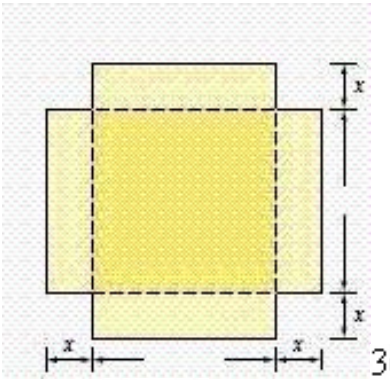
D. decreasing on $(-\infty, -1)$
increasing on $(1, \infty)$

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

32. A car was purchased for $35,000. Assuming the car depreciates at a rate of $4200 per year (*straight-line depreciation*) for the first 6 years, write the value v of the car as a function of the time t (measured in years) for $0 \le t \le 6$.

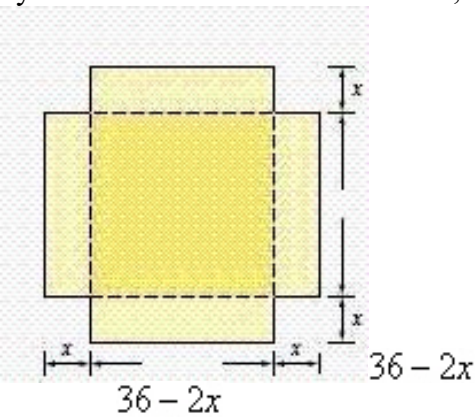
A. $v(t) = 35,000 + 4200t$
B. $v(t) = 35,000 - 4200(6)t$
C. $v(t) = 4200t - 35,000$
D. $v(t) = 35,000 + 4200(6)t$
E. $v(t) = 35,000 - 4200t$

33. An open box is to be made from a square piece of cardboard having dimensions 36 inches by 36 inches by cutting out squares of area x^2 from each corner as shown in the figure below. Express the volume V of the box as a function of x.



A. $V(x) = 1296 - 144x + 4x^2$
B. $V(x) = 1296x - 72x^2 + 4x^3$
C. $V(x) = 36x - 72x^2 + 4x^3$
D. $V(x) = 36x^2 - 2x^3$
E. $V(x) = 1296x - 144x^2 + 4x^3$

34. An open box is to be made from a square piece of cardboard having dimensions 36 inches by 36 inches by cutting out squares of area x^2 from each corner as shown in the figure below. If the volume of the box is given by $V(x) = 1296x - 144x^2 + 4x^3$, state the domain of V.



A. $0 < x < 18$
B. $144 < x < 1296$
C. $0 < x < 36$
D. all real numbers
E. $4 < x < 144$

35. Find the slope of the line that passes through the points $A(4, -1)$ and $B(9, -7)$.

A. $-\frac{11}{10}$
B. $-\frac{8}{13}$
C. $\frac{16}{5}$
D. $-\frac{6}{5}$
E. $\frac{6}{5}$

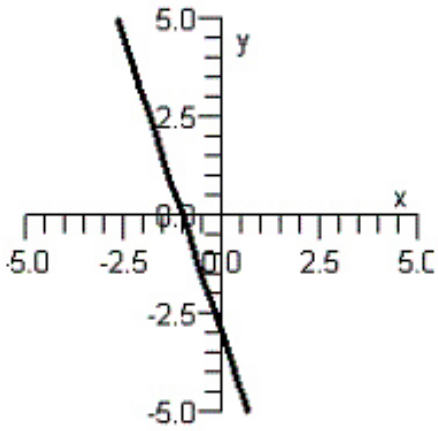
36. Find the slope of the line that passes through the points $(4, 1)$ and $(4, -5)$.

A. –6
B. 6
C. undefined
D. –3
E. 0

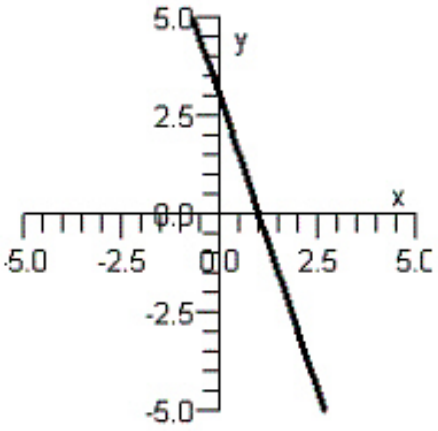
37. Graph y as a function of x by finding the slope and y-intercept of the line below.

$y = 3x - 3$

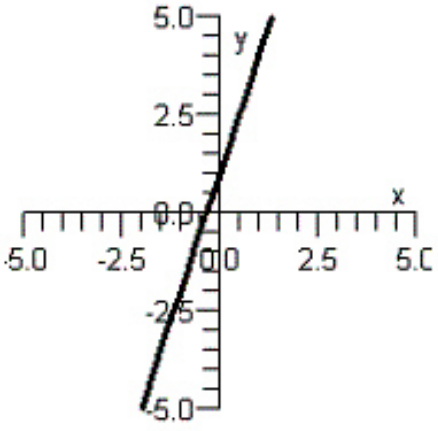
A.



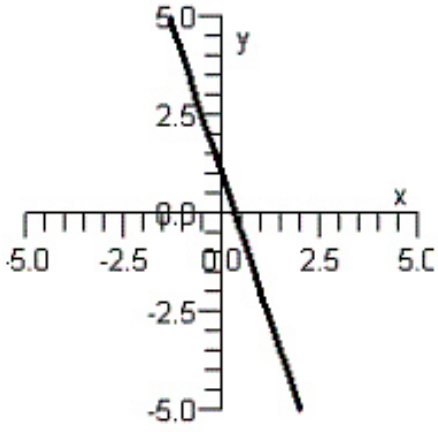
B.



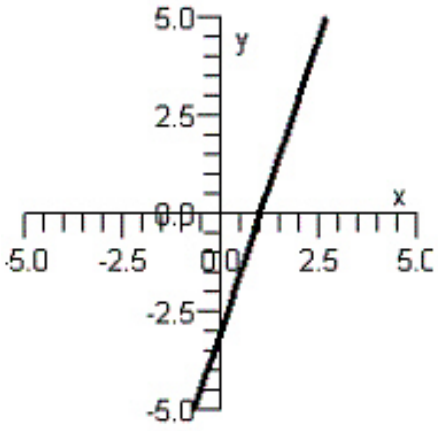
C.



D.



E.



38. Find the equation of the line that has *y*-intercept $(0, 6)$ and slope –4. Write the equation in the form $y = mx + b$.

A. $y = -6x - 4$

B. $y = -4x - 6$

C. $y = -4x + 6$

D. $y = 4x - 6$

E. $y = 6x - 4$

39. Find the value of *x* in the domain of $f(x) = 4x - 3$ for which $f(x) = 13$.

A. 1
B. 6
C. –3
D. 7
E. 4

40. Given the function below, find the solution of $f(x) = 0$.
$f(x) = -10x + 80$

A. 10
B. 8
C. –8
D. –10
E. 70

41. The federal minimum wage, in dollars per hour, for the years 1955 to 2005 is given in the table below. Using the data from 1955 and 1985, find a linear model that predicts the federal minimum wage for the year *t*. Round to nearest hundredth.

Year	Federal Minimum Wage
1955	0.75
1965	1.25
1975	2.10
1985	3.35
1995	4.25
2005	5.15

A. $W(t) = 0.09t - 30$
B. $W(t) = 0.09t - 169.35$
C. $W(t) = -2.60t - 169.35$
D. $W(t) = 2.60t + 30$
E. $W(t) = 3.35t + 30$

42. The federal minimum wage, in dollars per hour, for the years 1955 to 2005 is given in the table below. Using the data from 1955 and 1975, find a linear model (rounding the slope and intercept to 2 decimal places) that predicts the federal minimum wage for the year *t*. Use this model to predict in what year the federal minimum wage will exceed $5.80.

Year	Federal Minimum Wage
1955	0.75
1965	1.25
1975	2.10
1985	3.35
1995	4.25
2005	5.15

A. 2032
B. 2029
C. 2030
D. 2027
E. 2031

43. Determine the profit function, $P(x)$ if the revenue function and cost functions are $R(x) = 229x$ and $C(x) = 94x + 16,740$ respectively. Also find the break-even point.

A. $P(x) = 323x - 16,740$; $x = 52$, the break-even point
B. $P(x) = 135x - 16,740$; $x = 124$, the break-even point
C. $P(x) = 135x + 16,740$; $x = 124$, the break-even point
D. $P(x) = 323x + 16,740$; $x = 52$, the break-even point
E. $P(x) = 323x - 16,740$; $x = 124$, the break-even point

44. A rental car company purchases an automobile for $21,700. The automobile requires an average cost of $6.05 per day in maintenance. Find a linear function that expresses the total cost *C* of owning the automobile after *t* days.

A. $C(t) = 42.35t + 60.00$
B. $C(t) = 6.05t + 21,700$
C. $C(t) = 6.05t - 21,700$
D. $C(t) = 42.35t + 21,700$
E. $C(t) = 6.05t + 60.00$

45. A rental car company purchases an automobile for $22,300. The automobile requires an average cost of $7.85 per day in maintenance. The automobile rents for $45.00 a day. Find a linear function that expresses the total revenue *R* when the automobile has been rented for *t* days.

A. $R(t) = 45.00t$
B. $R(t) = 37.15t$
C. $R(t) = 52.85t$
D. $R(t) = 37.15t + 22,300$
E. $R(t) = 52.85t - 62.00$

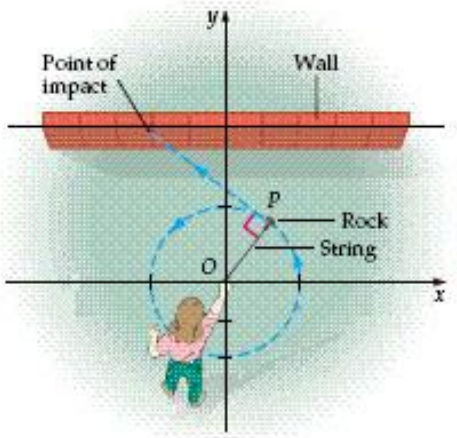
46. A rental car company purchases an automobile for $19,300. The automobile requires an average cost of $7.80 per day in maintenance. The automobile rents for $40.00 a day. The profit after *t* days, $P(t)$ is given by the function $P(t) = R(t) - C(t)$. Find the linear function $P(t)$.

A. $P(t) = 32.20t - 19,300$
B. $P(t) = 47.80t + 54.00$
C. $P(t) = 32.20t + 19,300$
D. $P(t) = 47.80t - 54.00$
E. $P(t) = 40.00t - 19,300$

47. A rental car company purchases an automobile for $18,800. The automobile requires an average cost of $8.40 per day in maintenance. The automobile rents for $60.00 a day. The profit after *t* days, $P(t)$, is given by the function $P(t) = R(t) - C(t)$. After finding the linear function $P(t)$, determine, to the nearest day, how many days it will take the company to break-even assuming the automobile is in use every day.

A. approximately 364 days
B. approximately 320 days
C. approximately 344 days
D. approximately 415 days
E. approximately 275 days

48. A rock attached to a string is whirled horizontally about the origin in a counterclockwise circular path with radius 10 feet. When the string breaks, the rock travels on a linear path perpendicular to the radius *OP* and hits the wall which is $y = 14$ feet away. If the string breaks when the rock is at $P(6, 8)$, find the *x*-coordinate of the point at which the rock hits the wall.



A. –2
B. –1
C. –4
D. –5
E. –3

49. Use the method of completing the square to find the standard form of the quadratic function below. State the vertex and axis of symmetry of the graph of the function.

$f(x) = x^2 + 14x + 42$

A. $f(x) = (x+7)^2 - 7$, vertex $(-7, -7)$, axis of symmetry $x = -7$
B. $f(x) = (x+7)^2 - 7$, vertex $(7, -7)$, axis of symmetry $x = -7$
C. $f(x) = (x-7)^2 + 7$, vertex $(-7, 7)$, axis of symmetry $x = -7$
D. $f(x) = (x+7)^2 - 7$, vertex $(-7, -7)$, axis of symmetry $x = -7$
E. $f(x) = (x-7)^2 + 7$, vertex $(7, 7)$, axis of symmetry $x = 7$

50. Write the quadratic function $f(x) = -x^2 + 2x + 6$ in standard form.

A. $f(x) = -(x+7)^2 - 1$

B. $f(x) = -(x-1)^2 + 7$

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

D. $f(x) = -(x+1)^2 + 7$

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

51. Use the vertex formula to determine the vertex of the graph of $f(x) = x^2 - 2x$ and write the function in standard form.

A. Vertex: $(-1, 1)$; $f(x) = (x-1)^2 + 1$

B. Vertex: $(-1, -1)$; $f(x) = (x+1)^2 + 1$

C. Vertex: $(1, 1)$; $f(x) = (x+1)^2 + 1$

D. Vertex: $(-1, -1)$; $f(x) = (x-1)^2 - 1$

E. Vertex: $(1, -1)$; $f(x) = (x-1)^2 - 1$

52. Find the range of $f(x) = 7x^2 - 12x + 1$.

A. $\left\{ y \middle| y \geq -\frac{29}{7} \right\}$

B. $\left\{ y \middle| y \geq \frac{6}{7} \right\}$

C. $\{ y | y \geq 1 \}$

D. $\{ y | y \geq 0 \}$

E. $\left\{ y \middle| y \geq -\frac{58}{7} \right\}$

53. Find the maximum or minimum value of the function below. State whether this value is a maximum or a minimum.

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

A. –2, a minimum
B. 1, a minimum
C. 2, a maximum
D. –2, a maximum
E. 2, a minimum

54. The sum of the length *l* and the width *w* of a rectangular region is 250 meters. Write *l* as a function of *w*.

A. $l = 250 - w$
B. $w = 250 - l$
C. $l + w = 250$
D. $l = 250 + w$
E. $w = 250 + l$

55. The sum of the length *l* and the width *w* of a rectangular region is 200 meters. Write the area *A* as a function of *w*.

A. $A(w) = w^2 - 200$
B. $A(w) = 200w - w^2$
C. $A(w) = w^2 + 200w$
D. $A(w) = 200 - w$
E. $A(w) = w^2 - 200w$

56. The sum of the length *l* and the width *w* of a rectangular region is 210 meters. Find the dimensions that produce the greatest area.

A. $l = 105;\ w = 105$
B. $l = 95;\ w = 115$
C. $l = 120;\ w = 90$
D. $l = 100;\ w = 115$
E. $l = 110;\ w = 100$

57. An air freight company has determined that the cost, in dollars, of delivering x parcels per flight is $C(x) = 2248 + 8x$. The price per parcel, in dollars, the company charges to send x parcels is $p(x) = 24 - 0.01x$. Determine the revenue function.

A. $R(x) = -0.01x^2 + 24x$
B. $R(x) = -32x^2 + 2247.99$
C. $R(x) = 22.48x^2 + 32x$
D. $R(x) = 2247.99x^2 + 32$
E. $R(x) = -22.48x^2 + 32x$

58. An air freight company has determined that the cost, in dollars, of delivering x parcels per flight is $C(x) = 2169 + 5x$. The price per parcel, in dollars, the company charges to send x parcels is $p(x) = 20 - 0.03x$. Determine the profit function.

A. $P(x) = -0.03x^2 + 15x$
B. $P(x) = -4.97x^2 + 2149x + 20$
C. $P(x) = -5.03x^2 + 20x - 2169$
D. $P(x) = -0.03x^2 + 15x - 2169$
E. $P(x) = -4.97x^2 + 15x - 2169$

59. An air freight company has determined that the cost, in dollars, of delivering x parcels per flight is $C(x) = 2178 + 7x$. The price per parcel, in dollars, the company charges to send x parcels is $p(x) = 25 - 0.02x$. Determine the company's maximum profit to the nearest dollar.

A. $5316
B. $2396
C. $8172
D. $5904
E. $1872

60. An air freight company has determined that the cost, in dollars, of delivering x parcels per flight is $C(x) = 2010 + 6x$. The price per parcel, in dollars, the company charges to send x parcels is $p(x) = 25 - 0.02x$. Determine the price per parcel that yields the maximum profit.

A. $12.75
B. $10.75
C. $15.50
D. $6.00
E. $18.75

61. An air freight company has determined that the cost, in dollars, of delivering x parcels per flight is $C(x) = 1877 + 7x$. The price per parcel, in dollars, the company charges to send x parcels is $p(x) = 25 - 0.02x$. Determine the minimum number of parcels the air freight company must ship to break even.

A. 210 parcels
B. 256 parcels
C. 121 parcels
D. 286 parcels
E. 390 parcels

62. The height in feet of a projectile with an initial velocity of 64 feet per second and an initial height of 50 feet is a function of time t, in seconds, given by $h(t) = -16t^2 + 64t + 50$. Find the maximum height of the projectile.

A. 127 ft
B. 114 ft
C. 121 ft
D. 146 ft
E. 51 ft

63. The height in feet of a projectile with an initial velocity of 224 feet per second and an initial height of 55 feet is a function of time t, in seconds, given by $h(t) = -16t^2 + 224t + 55$. Find the time t when the projectile reaches its maximum height.

A. 9 s
B. 6 s
C. 5 s
D. 8 s
E. 7 s

64. The height in feet of a projectile with an initial velocity of 55 feet per second and an initial height of 58 feet is a function of time *t*, in seconds, given by $h(t) = -16t^2 + 55t + 58$. Find the time *t* when the projectile has a height of 0 feet. Round to nearest tenth of a second.

A. 5.1 s
B. 4.3 s
C. 6.0 s
D. 4.7 s
E. 3.4 s

65. Determine whether the graph of $x = -7y^6 + 11$ is symmetric with respect to the *x*-axis and/or the *y*-axis.

A. symmetric with respect to the *y*-axis
B. symmetric with respect to neither
C. symmetric with respect to both
D. symmetric with respect to the *x*-axis

66. Determine whether the graph of $y = -5x^6 + 2x^3$ is symmetric with respect to the origin.

A. yes
B. no

67. Determine whether $f(x) = x^4 - 5$ is an even function, an odd function, or neither.

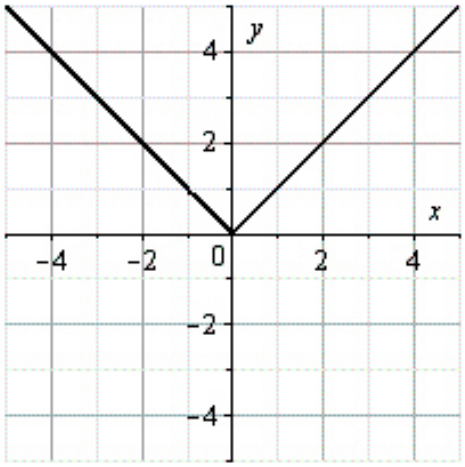
A. even function
B. neither
C. odd function

68. Determine whether $f(x) = x^9 - x^3$ is an even function, an odd function, or neither.

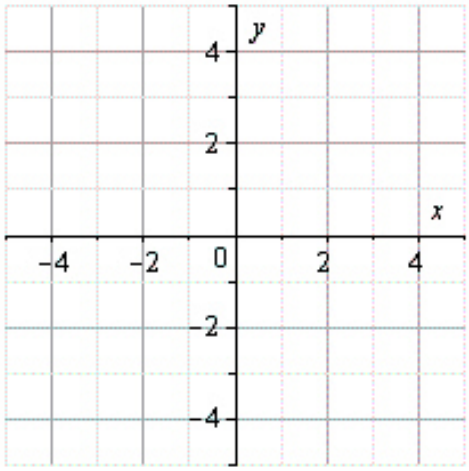
A. even function
B. odd function
C. neither

69. Use the graph of *g,* shown below, to sketch the graph of the function below.

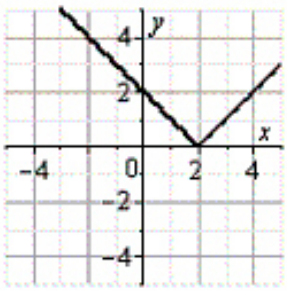
g



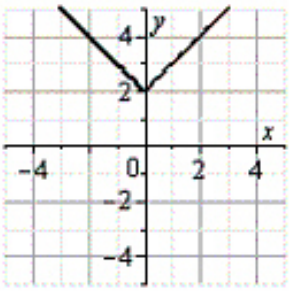
$y = g(x) - 2$



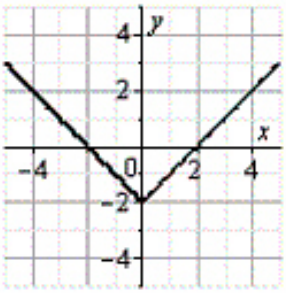
A.


y
x
4
2
0
-2
-4
-4
2
4

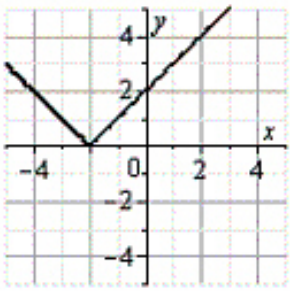
B.


y
x
4
2
0
-2
-4
-4
2
4

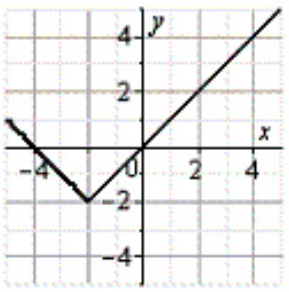
C.


y
x
4
2
0
-2
-4
-4
2
4

D.

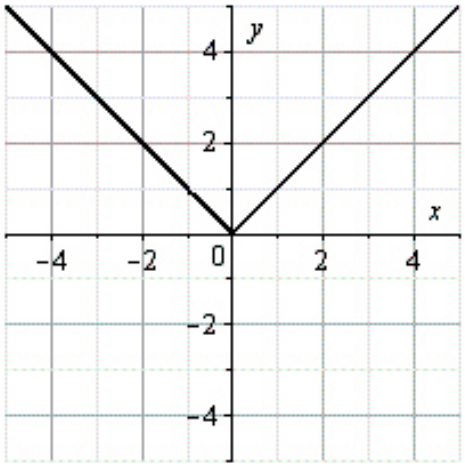

y
x
4
2
0
-2
-4
-4
2
4

E.

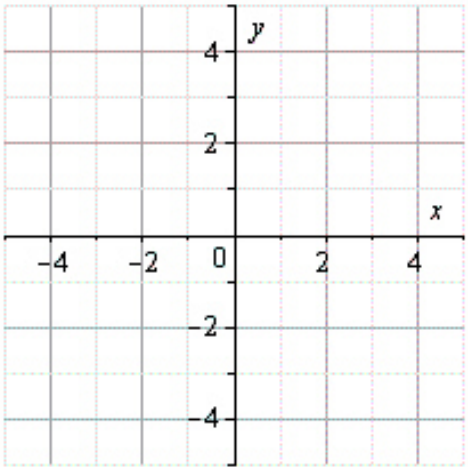

y
x
4
2
0
-2
-4
-4
2
4

70. Use the graph of *g,* shown below, to sketch the graph of the function below.

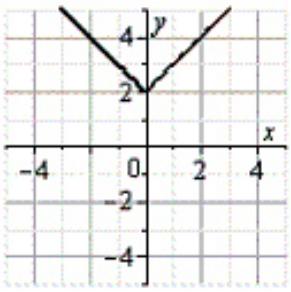
g



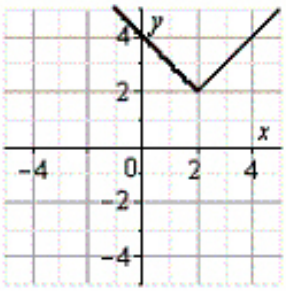
$y = g(x + 2)$



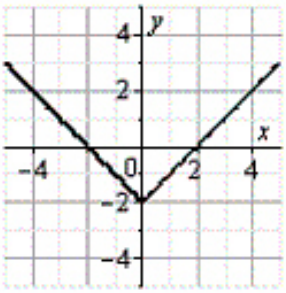
A.


y
x
4
2
0
-2
-4
-4
2
4

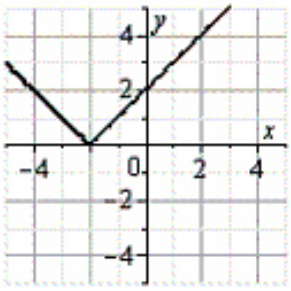
B.


y
x
4
2
0
-2
-4
-4
2
4

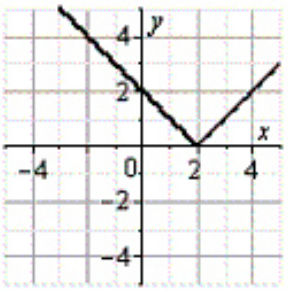
C.


y
x
4
2
0
-2
-4
-4
2
4

D.

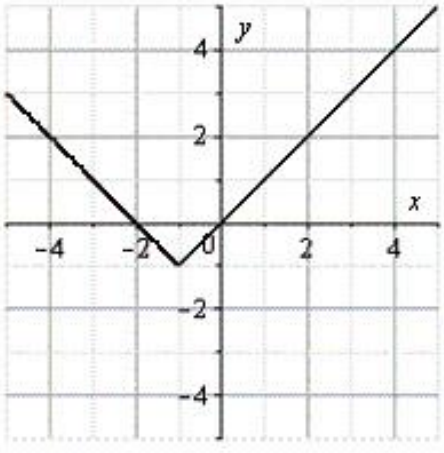

y
x
4
2
0
-2
-4
-4
2
4

E.

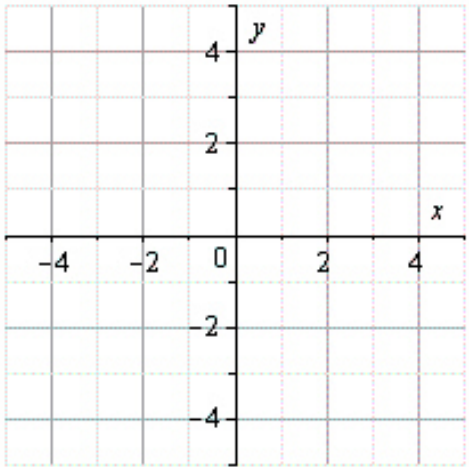

y
x
4
2
0
-2
-4
-4
2
4

71. Use the graph of *E,* shown below, to sketch the graph of the function below.

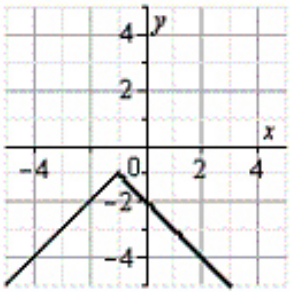
E



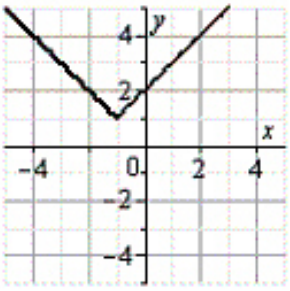
$-E(x)$



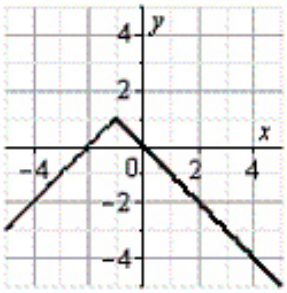
A.



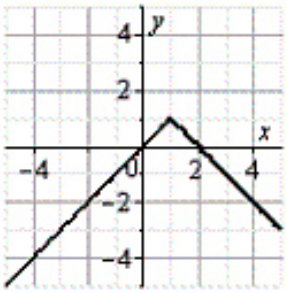
B.



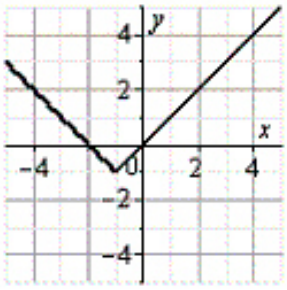
C.



D.

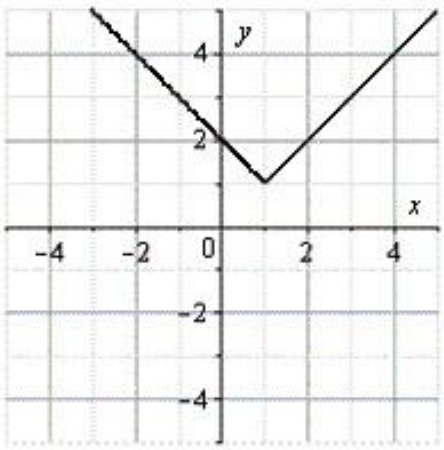


E.

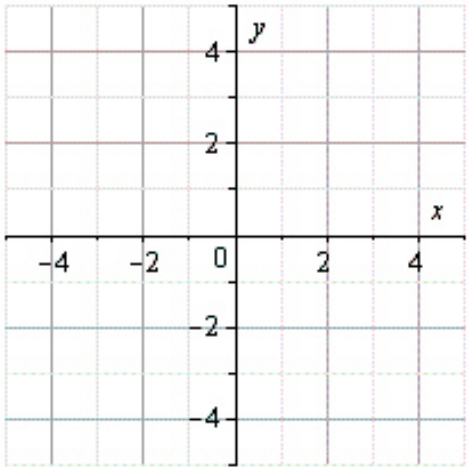


72. Use the graph of *E,* shown below, to sketch the graph of the function below.

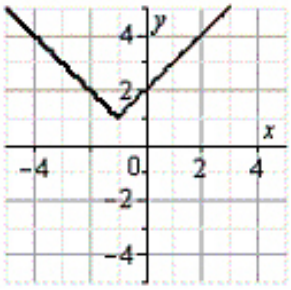
E



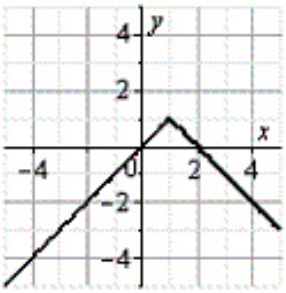
$E(-x)$



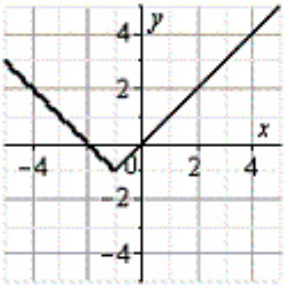
A.


y
x
4
2
0
-2
-4
-4
2
4

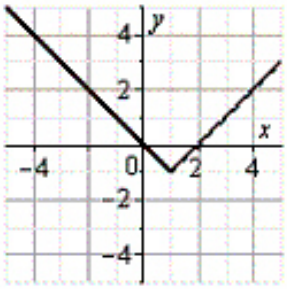
B.


y
x
4
2
0
-2
-4
-4
2
4

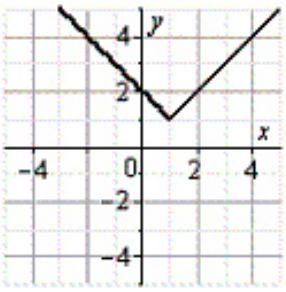
C.


y
x
4
2
0
-2
-4
-4
2
4

D.


y
x
4
2
0
-2
-4
-4
2
4

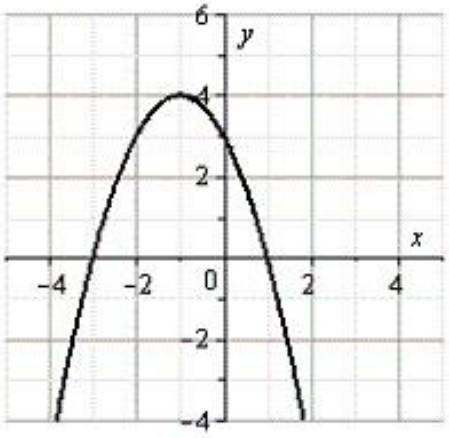
E.

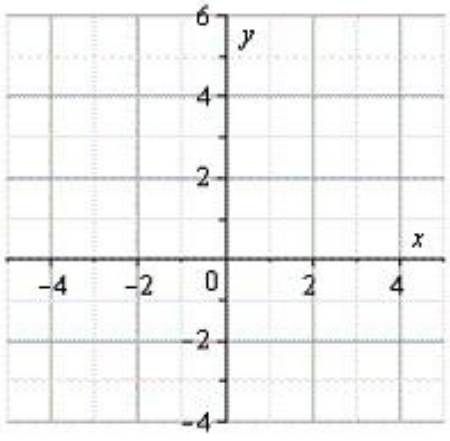

y
x
4
2
0
-2
-4
-4
2
4

73. Use the graph of *n,* shown below, to sketch the graph of the function below.

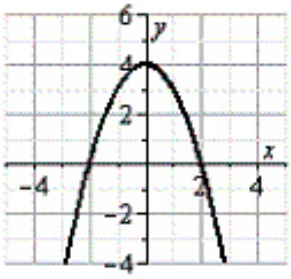
n

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

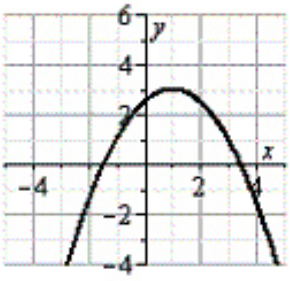




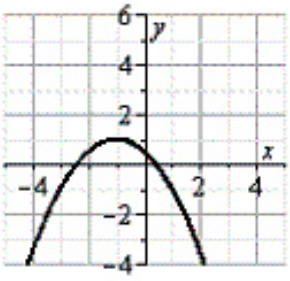
A.


6
y
4
2
x
-4
2
4
-2
-4

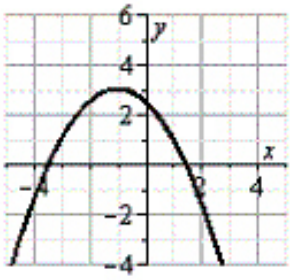
B.


6
y
4
2
x
-4
2
4
-2
-4

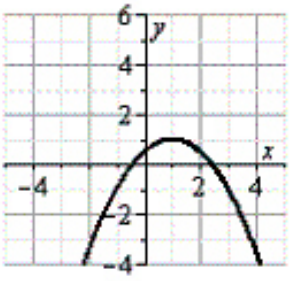
C.


6
y
4
2
x
-4
2
4
-2
-4

D.

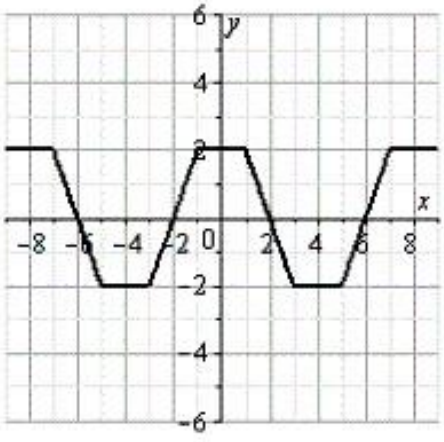

6
y
4
2
x
-4
2
4
-2
-4

E.

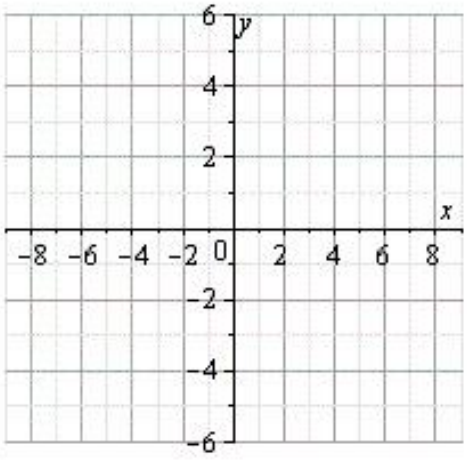

6
y
4
2
x
-4
2
4
-2
-4

74. Use the graph of $y = g(x)$ shown below, to sketch the graph of the function below.

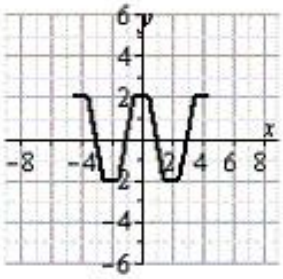
$y = g(x)$



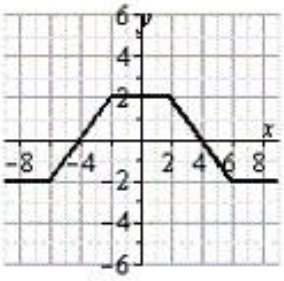
$y = g(2x)$



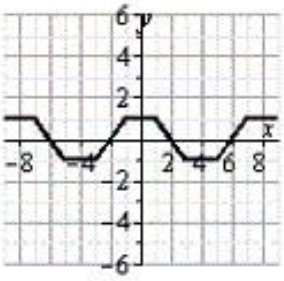
A.


y
x
6
4
2
-2
-4
-6
-8
-4
2
4
6
8

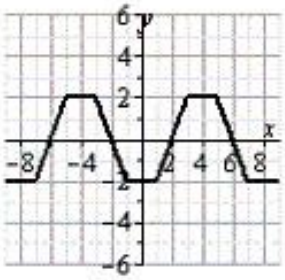
B.


y
x
6
4
2
-2
-4
-6
-8
-4
2
4
6
8

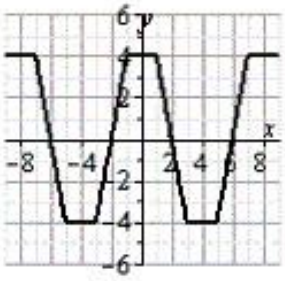
C.


y
x
6
4
2
-2
-4
-6
-8
-4
2
4
6
8

D.


y
x
6
4
2
-2
-4
-6
-8
-4
2
4
6
8

E.


y
x
6
-4
-6
-8
-4
2
4
8

75. Find $(f/g)(x)$.

$f(x) = x^2 - 7x \qquad g(x) = -6 - x$

$$(f/g)(x) = \frac{x^2 - 7x}{-6 - x}, \; x \neq 0$$

A.

$$(f/g)(x) = -\frac{x^2}{6} + 7, \; x \neq 0$$

B.

$$(f/g)(x) = \frac{x^2 - 7x}{-6 - x}, \; x \neq -6$$

C.

$$(f/g)(x) = \frac{x - 7}{-6}, \; x \neq 0$$

D.

$$(f/g)(x) = \frac{x^2 - 7x}{-6 - x}, \; x \neq 6$$

E.

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

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

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

A. $(f+g)(x) = 2x^2 + 5x - 1$

B. $(f+g)(x) = -2x^4 - 5x^2 + 1$

C. $(f+g)(x) = 6x^4 + 13x^2 + 5$

D. $(f+g)(x) = 6x^2 + 13x + 5$

E. $(f+g)(x) = -2x^2 - 5x + 1$

77. Find $(fg)(x)$.

$f(x) = \sqrt{2x}$ $\quad$ $g(x) = \sqrt{-3x+6}$

A. $(fg)(x) = x\sqrt{-6} + 2\sqrt{3x}$

B. $(fg)(x) = \sqrt{-x+6}$

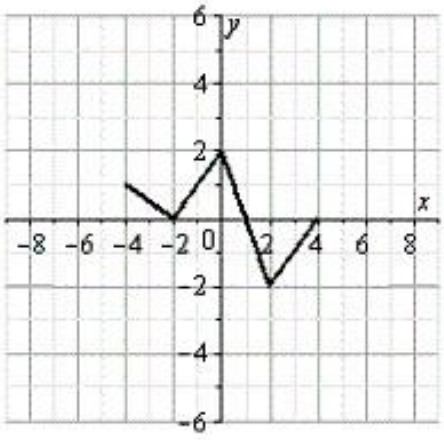
C. $(fg)(x) = \sqrt{-6x^2+12x}$

D. $(fg)(x) = \sqrt{-6x^2+6}$

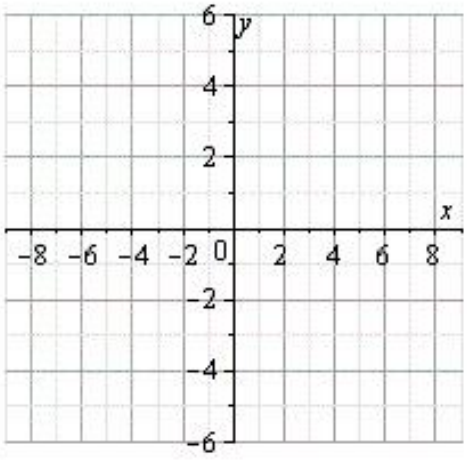
E. $(fg)(x) = 2x\sqrt{-6+3x}$

78. Use the graph of $y = g(x)$, shown below, to sketch the graph of the function below.

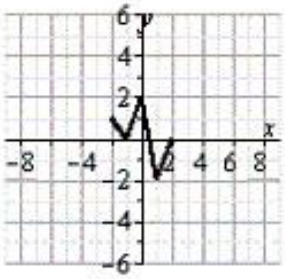
$y = g(x)$



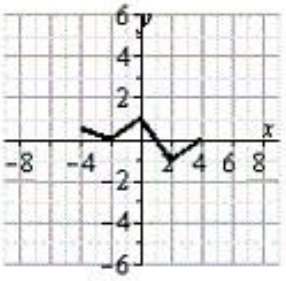
$y = g\left(\frac{1}{2}x\right)$



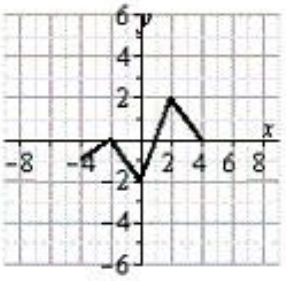
A.


y
x
6
4
2
-8
-4
2
4
6
8
-2
-4
-6

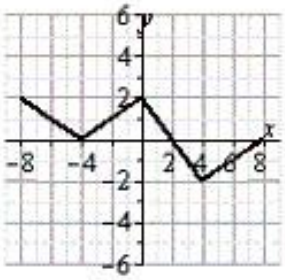
B.


y
x
6
4
2
-8
-4
2
4
6
8
-2
-4
-6

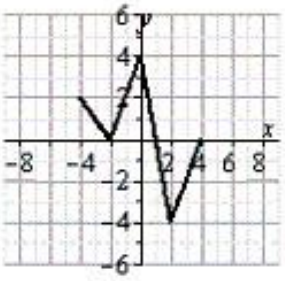
C.


y
x
6
4
2
-8
-4
2
4
6
8
-2
-4
-6

D.


y
x
6
4
2
-8
-4
2
4
6
8
-2
-4
-6

E.


y
x
6
4
-8
-4
2
4
6
8
-2
-4
-6

79. If $f(x) = \sqrt{x-3}$ and $g(x) = -x$, find $f+g$ and state the domain.

A. $(f+g)(x) = \sqrt{x-3} - x$; $\{x | x \geq 3\}$

B. $(f+g)(x) = \sqrt{-2x-3}$; $\{x | x \leq -3\}$

C. $(f+g)(x) = \sqrt{x^2+3x}$; all real numbers

D. $(f+g)(x) = \sqrt{-3}$; $\{x | x = -3\}$

E. $(f+g)(x) = -x\sqrt{x-3}$; $\{x | x \geq 3\}$

80. Evaluate $(f-g)(-2)$ where $f(x) = x^2 - 3x - 18$ and $g(x) = -3x + 8$.

A. –8
B. –6
C. –22
D. –28
E. 6

81. Evaluate $(f+g)(3)$ where $f(x) = x^2 + 6x + 5$ and $g(x) = 5x - 1$.

A. 14
B. 18
C. 32
D. 46
E. 40

82. Evaluate $(fg)(-2)$ where $f(x) = x^2 + 6x - 16$ and $g(x) = -7x - 8$.

A. –144
B. 0
C. 144
D. –344
E. 48

83. Evaluate $\left(\frac{f}{g}\right)(2)$ where $f(x) = x^2 + 8x - 33$ and $g(x) = 3x + 18$.

A. $-\frac{13}{24}$
B. $-\frac{13}{20}$
C. $\frac{5}{6}$
D. $-\frac{29}{24}$
E. $-\frac{5}{8}$

84. Find the difference quotient of $f(x) = -3x - 7$.

A. $-3h$
B. $-3 + h$
C. $\frac{-3h - 14}{h}$
D. –3
E. $\frac{h - 14}{h}$

85. Find the difference quotient of the function $f(x) = 9x^2 - 2$.

A. $18x - h$
B. $18x + h$
C. $18x - 9h$
D. $18x + 9h$
E. $2x + h$

86. Find $f \circ g$.
$f(x) = -3x + 4 \qquad g(x) = x - 8$

A. $(f \circ g)(x) = -3x + 28$
B. $(f \circ g)(x) = -3x - 4$
C. $(f \circ g)(x) = -4x - 4$
D. $(f \circ g)(x) = -3x^2 + 28x - 32$
E. $(f \circ g)(x) = -4x + 12$

87. Find $g \circ f$.
$f(x) = x + 5 \qquad g(x) = x^2$

A. $(g \circ f)(x) = x^2 + 25$
B. $(g \circ f)(x) = x^2 - 25$
C. $(g \circ f)(x) = x^2 + 5$
D. $(g \circ f)(x) = x^2 + 10x + 25$
E. $(g \circ f)(x) = x^2 + 5x + 25$

88. Find $f \circ g$.

$f(x) = \left|x^2+4\right|$ $\quad g(x) = 5 - x$

$(f \circ g)(x) = 5 - \left|x^2+4\right|$

A.

$(f \circ g)(x) = \left|1-x^2\right|$

B.

$(f \circ g)(x) = \left|x^2-10x+29\right|$

C.

$(f \circ g)(x) = \left|9-x^2\right|$

D.

$(f \circ g)(x) = \left|x^2+29\right|$

E.

89. Find the difference quotient of the function $f(x) = 8x^2 + 3x + 8$.

A. $16x + 8h + 3$
B. $16x - h$
C. $16x + 8h$
D. $16x + h$
E. $16x - 8h$

90. Evaluate the following composite function if $f(x) = 3x + 4$ and $g(x) = x^2 - 10$.
$(f \circ g)(2)$

A. 6
B. 112
C. –8
D. 2
E. –14

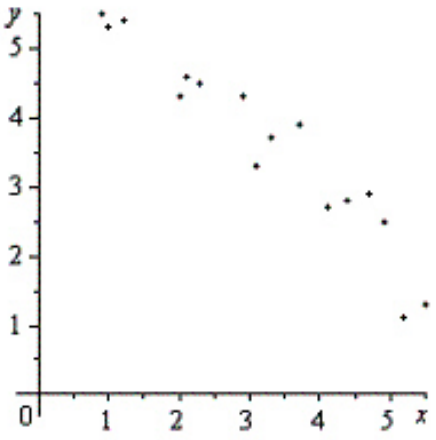
91. A water tank has the shape of a right circular cone with height 12 feet and radius 8 feet. Water is running into the tank so that the radius *r* (in feet) of the surface of the water is given by $r = 0.75t$ where *t* is the time (in minutes) that the water has been running. The volume V of the water is given by

$$V = \frac{1}{3}\pi r^2 h$$

Find $V(t)$ and use it to determine the volume of the water when $t = 5$ minutes. Round to the nearest tenth.

A. 22.1 cubic feet
B. 36.8 cubic feet
C. 49.1 cubic feet
D. 14.7 cubic feet
E. 82.8 cubic feet

92. Determine whether the following scatter diagram suggests a linear relationship between *x* and *y*, a nonlinear relationship between *x* and *y*, or no relationship between *x* and *y*.



A. no relationship between *x* and *y*
B. nonlinear relationship between *x* and *y*
C. linear relationship between *x* and *y*

93. Determine for which scatter diagram, **A** or **B**, the coefficient of determination is closer to 1.

Diagram A

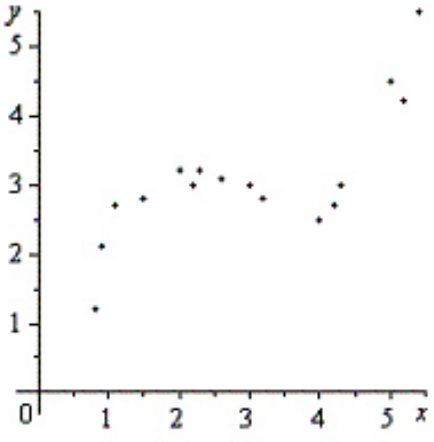
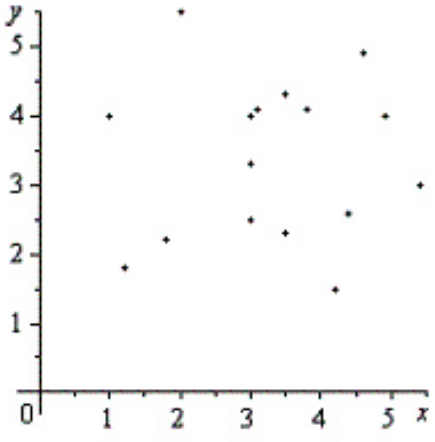


Diagram B



A. Diagram A
B. Diagram B

94. Find the linear regression equation for the set of data given below.
$\{(3, 6), (4, 9), (6, 10), (8, 13), (11, 16)\}$

A. $y = 1.174757x + 3.281553$
B. $y = 1.452434x + 3.490265$
C. $y = 1.28002x + 3.386817$
D. $y = 0.964231x + 3.597343$
E. $y = 1.038641x + 3.214403$

95. Find a quadratic regression model for the data below.
$\{(-3,4.1),(-1,-2.1),(0,-4.3),(1,4.6),(2,6.1)(3,8)\}$

A. $y = 0.5904761905x^2 + 1.497142857x - 0.4276190476$
B. $y = 0.8357142857x^2 + 1.077142857x - 0.9685714286$
C. $y = 1.414285714x^2 + 1.954285714x - 2.705714286$
D. $y = 0.7619047619x^2 + 2.401428571x - 2.264761905$
E. $y = 0.6071428571x^2 + 0.1442857143x + 1.54$

96. Suppose the average remaining lifetime for women in a given country is given in the following table.

Age	*Years*
5	76.3
10	70.7
20	61.7
30	52.7
40	43.9

Compute the linear regression equation for these data, where x is the age, in years, and A is the remaining lifetime, in years. Round parameters to the nearest hundredth.

A. $A(x) = -8.28x + 63.81$

B. $A(x) = -8.28x + 85.90$

C. $A(x) = -0.92x + 85.90$

D. $A(x) = -8.28x + 80.31$

E. $A(x) = -0.92x + 80.31$

97. Suppose the average remaining lifetime for women in a given country is given in the following table.

Age	*Years*
5	67.6
20	56.4
25	51.4
45	34.2
65	19.0

Find the linear regression equation for these data, whose parameters are rounded to the nearest hundredth, where x is the age, in years, and A is the remaining lifetime, in years. Use the regression equation to estimate the remaining lifetime for a 24-year old woman.

A. 53.96 years
B. 58.88 years
C. 48.22 years
D. 51.5 years
E. 46.58 years

98. The table below gives the wingspan, in centimeters, and the average observed flying speeds, in knots, of various birds.

Species	**Wingspan (cm)**	**Flying Speed (knots)**
House Martin	28	30
Swallow	31	33
Thrush	45	34
Carrion Crow	49	35
Jackdaw	50	32

Based on these data, what is the flying speed of a Starling whose wingspan is 35 centimeters? Do not round any values in your calculations but round the final answer to the nearest knot.

A. 33
B. 31
C. 32
D. 35
E. 34

99. The fuel efficiency, in miles per gallon, for a certain midsize car at various speeds, in miles per hour, is given in the table below.

mph	mpg	mph	mpg
25	25	55	30
30	31	60	26
35	36	65	24
40	35	70	15
45	32	75	12
50	33		

Find a quadratic model for these data.

A. $y = -0.0225174825x^2 + 1.915384615x - 6.664335664$

B. $y = -0.0165034965x^2 + 1.366713287x + 5.685314685$

C. $y = -0.0344055944x^2 + 3.662377622x - 55.77622378$

D. $y = -0.0280652681x^2 + 2.897435897 - 38.32867133$

E. $y = -0.0258741259x^2 + 2.578321678x - 28.03496503$

100. The fuel efficiency, in miles per gallon, for a certain midsize car at various speeds, in miles per hour, is given in the table below.

mph	mpg	mph	mpg
25	20	55	31
30	24	60	33
35	32	65	30
40	35	70	24
45	36	75	22
50	40		

Find a quadratic model for these data and use it to predict the fuel efficiency of this car when it is traveling at a speed of 40 mph. Do not round any values in your calculations but round the final answer to the nearest tenth.

A. 32.7 mpg
B. 34.9 mpg
C. 33.7 mpg
D. 33.9 mpg
E. 35.7 mpg

101. The table below shows the velocities, in feet per second, of a ball that is thrown horizontally from the top of a 50 foot building and the distances, in feet, that it lands from the base of the building. Compute the linear regression equation for these data.

Velocity (ft/sec)	Distance (ft)
10	32
15	45
20	72
25	85
30	90
40	110
50	170

A. $y = 2.944432432x - 0.7139459459$
B. $y = 3.028222013x - 1.079962371$
C. $y = 3.073502956x + 2.338987407$
D. $y = 3.02463355x + 3.626221498$
E. $y = 3.156886228x + .5988023952$

102. The table below shows the velocities, in feet per second, of a ball that is thrown horizontally from the top of a 50 foot building and the distances, in feet, that it lands from the base of the building. Compute the linear regression equation for these data, rounding to 5 decimal places, and then using this model, find the expected distance a ball will travel when the velocity is 53 feet per second. Round your final answer to the nearest foot.

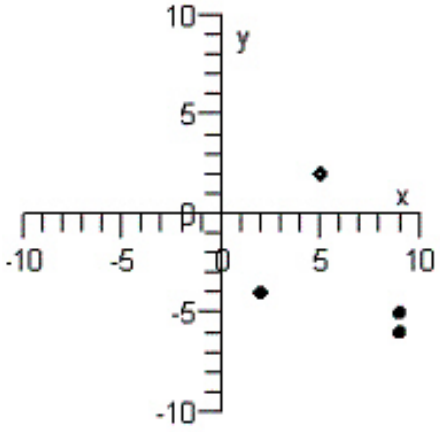
Velocity (ft/sec)	Distance (ft)
15	48
25	80
29	100
33	95
38	112
40	130
48	150

A. 167
B. 170
C. 164
D. 169
E. 166

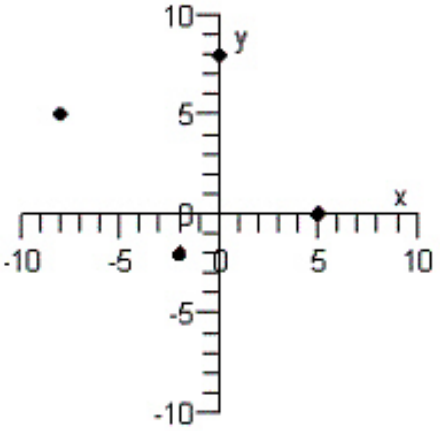
Chapter 2--Functions and Graphs Key

1. Plot the points below whose coordinates are given on a Cartesian coordinate system.
$(5, 2), (9, -6), (2, -4), (9, -5)$

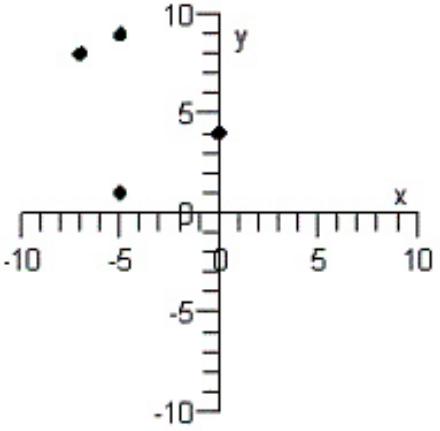
A.



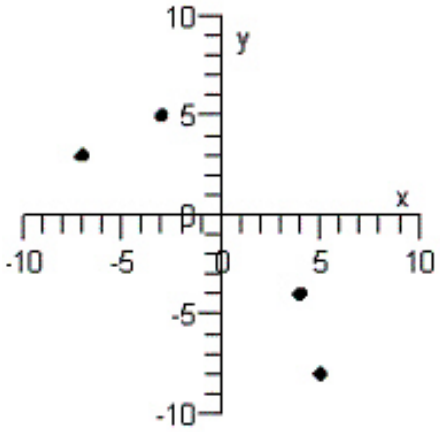
B.

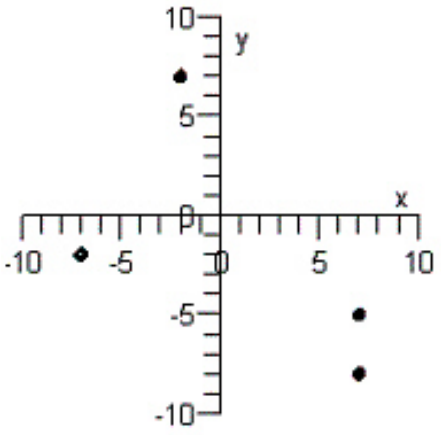


C.



D.



E. 

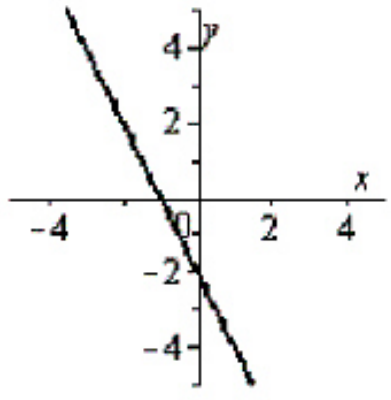
2. Find the distance between the two points $(3, -1)$ and $(3, 2)$.

A. 6
B. 1
C. 5
D. 7
E. 3

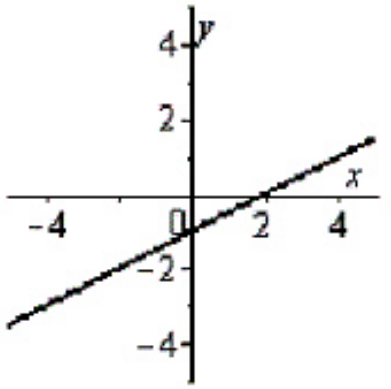
3. Find the midpoint between the two points $(11, -5)$ and $(-7, -3)$.

A. $(9, 1)$
B. $(4, -4)$
C. $(9, -4)$
D. $(2, -4)$
E. $(2, 1)$

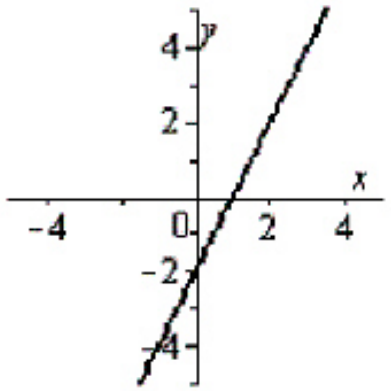
4. Graph the following equation by plotting points that satisfy the equation.
$x + 2y = 1$



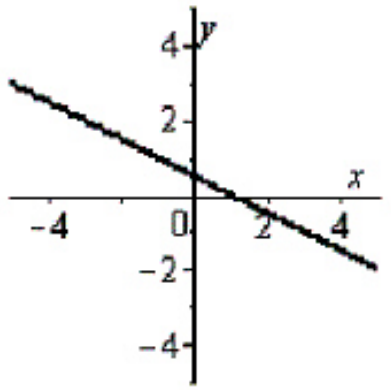
A.



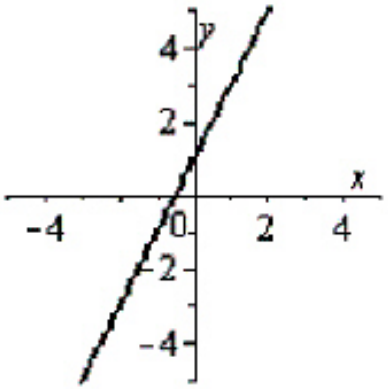
B.



C.

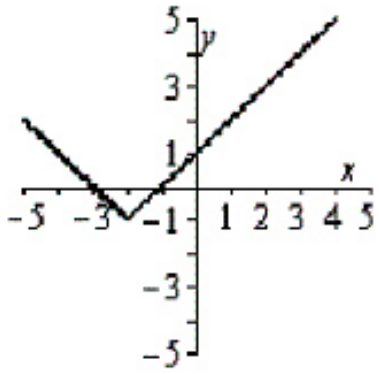


D.

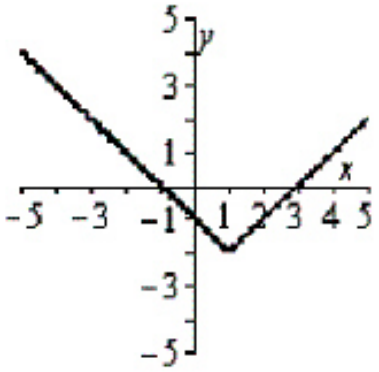


E.

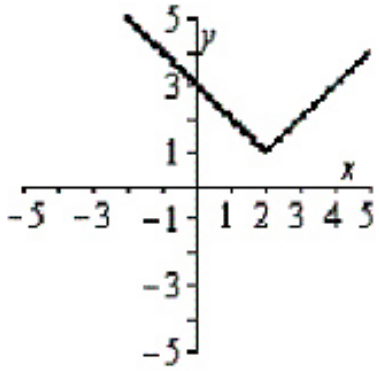
5. Graph the following equation by plotting points that satisfy the equation.
$y = |x - 2| + 1$



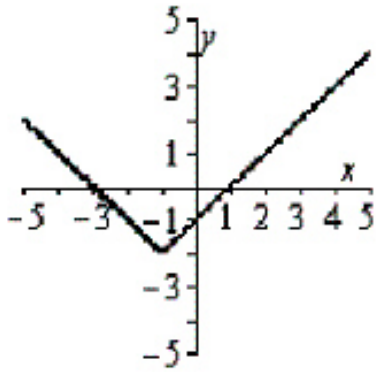
A.



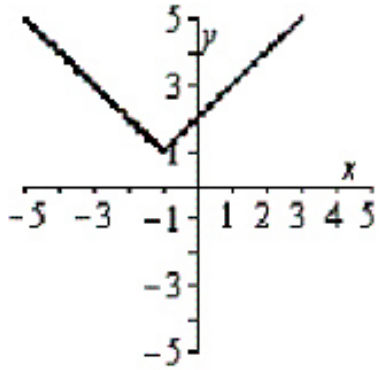
B.



C.



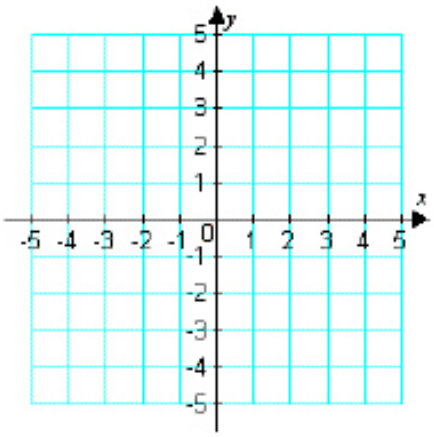
D.



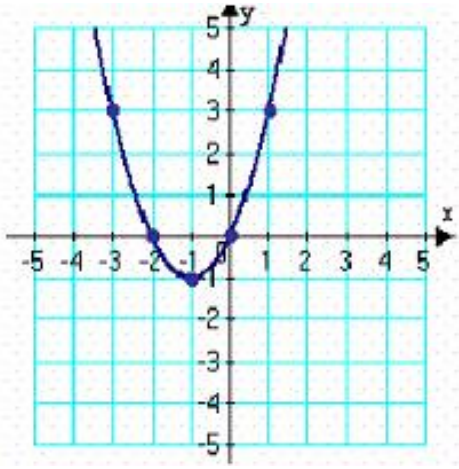
E.

6. Create and complete a table to find the x and y coordinates of points that lie on the graph of the equation below. Plot at least 5 points along with the graph of the equation.

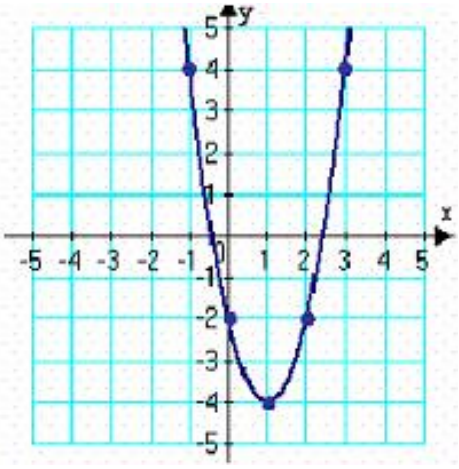
$y = x^2 + 4x$



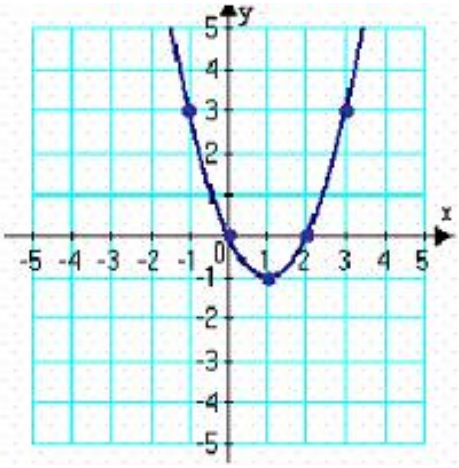
A.



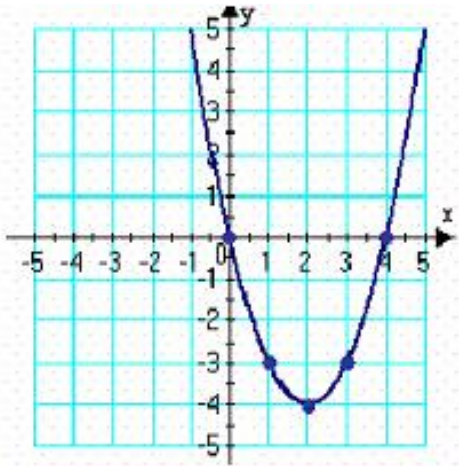
B.



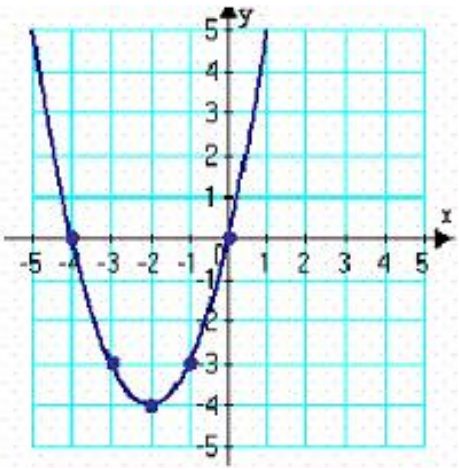
C.


y
x
5
4
3
2
1
0
-1
-2
-3
-4
-5
-5 -4 -3 -2 -1 1 2 3 4 5

D.


y
x
5
4
3
2
1
0
-1
-2
-3
-4
-5
-5 -4 -3 -2 -1 1 2 3 4 5

E.


y
x
5
4
3
2
1
0
-1
-2
-3
-4
-5
-5 -4 -3 -2 -1 1 2 3 4 5

7. Find the x- and y-intercepts of the graph of the following equation.

$-9x + 11y = -4$

A. x-int: $\left(-\frac{9}{11}, 0\right)$; y-int: $\left(0, -\frac{11}{9}\right)$

B. x-int: $\left(\frac{4}{9}, 0\right)$; y-int: $\left(0, -\frac{4}{11}\right)$

C. x-int: $\left(-\frac{9}{11}, 0\right)$; y-int: $\left(0, -\frac{4}{11}\right)$

D. x-int: $\left(\frac{4}{9}, 0\right)$; y-int: $\left(0, -\frac{11}{9}\right)$

E. x-int: $\left(\frac{9}{4}, 0\right)$; y-int: $\left(0, -\frac{9}{11}\right)$

8. Determine the center and radius of the circle with the following equation.

$(x-1)^2 + (y+2)^2 = 225$

A. center: $(1, -2)$; radius: 15

B. center: $(-1, 2)$; radius: $\frac{15}{2}$

C. center: $\left(-\frac{1}{15}, \frac{2}{15}\right)$; radius: 1

D. center: $(1, -2)$; radius: 225

E. center: $(-1, 2)$; radius: 15

9. Find an equation of a circle that satisfies the following condition. Write your answer in standard form.
Center: $(-2, -6)$; passing through $(4, 5)$

$(x+2)^2+(y+6)^2=\left(\sqrt{157}\right)^2$

A.

$(x+2)^2+(y+6)^2=\left(\sqrt{41}\right)^2$

B.

$(x-4)^2+(y-5)^2=\left(\sqrt{41}\right)^2$

C.

$(x-4)^2+(y-5)^2=\left(\sqrt{157}\right)^2$

D.

$(x-2)^2+(y-6)^2=\left(\sqrt{157}\right)^2$

E.

10. Find the center and radius of the graph of the circle. The equation of the circle is written in general form.
$x^2+y^2+6x-4y-23=0$

A. center: $(-6, 4)$; radius: 6

B. center: $(-3, 2)$; radius: 6

C. center: $(3, -2)$; radius: $\sqrt{23}$

D. center: $(-6, 4)$; radius: $\sqrt{23}$

E. center: $(3, -2)$; radius: 6

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

A. $y = 7x+6$

B. $x = -6y-2$

C. $y = \left|-4+5x^2\right|$

D. $y = \sqrt{5+8x}$

E. $x = -5$

12. Which set of ordered pairs represents a function from *P* to *Q*?
$P = \{5, 10, 15, 20\}$ $Q = \{-2, 0, 2\}$

A. $\{(15,-2),(15,0),(15,2)\}$

B. $\{(5,-2),(10,0),(10,2),(15,0),(20,-2)\}$

C. $\{(10,0),(15,2),(20,0)\}$

D. $\{(5,2),(15,0),(5,-2),(15,2)\}$

E. $\{(15,0),(10,-2),(5,0),(10,2),(15,-2)\}$

13. Given $p(x) = 3x^2 - 9$, find $p(6)$.

A. 27
B. 99
C. 9
D. 117
E. 108

14. Given $m(x) = 6x^2 + 2$, find $m(-1)$.

A. 4
B. 6
C. –4
D. 8
E. –10

15. Given $p(x) = 7x^2 + 6$, find $p(0)$.

A. 14
B. 8
C. 20
D. 13
E. 6

16. Given $t(x) = 2x^2 - 1$, find $t\left(\frac{2}{3}\right)$.

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

B. $-\frac{1}{9}$

C. $\frac{1}{3}$

D. $\frac{5}{9}$

E. $\frac{5}{3}$

17. Given $q(x) = 3x^2 + 3$, find $q(u)$.

A. $9u^2 + 3$

B. $3u^2 + 3u$

C. $6u^2$

D. $9u^2 + 9$

E. $3u^2 + 3$

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

$f(w) = \dfrac{-2w}{5w-2}$

$f(t-8)$

A. $\dfrac{-2w+16}{5w-42}$

B. $\dfrac{-2t+16}{5t-42}$

C. $-\dfrac{8}{21}$

D. $\dfrac{8}{19}$

E. $\dfrac{-2t-16}{5t-42}$

19. Given $r(x) = \dfrac{x}{x-3}$, find $r(-9)$.

A. 1

B. $\dfrac{4}{3}$

C. $\dfrac{3}{4}$

D. –12

E. –2

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

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

$g\left(\frac{3}{5}\right)$

A. $\frac{6}{5}$

B. $-\frac{81}{125}$

C. $-\frac{27}{25}$

D. $\frac{27}{20}$

E. $-\frac{27}{125}$

21. Determine the domain of the following function.

$f(x) = 2x - 5$

A. all real numbers

B. $\left\{x \middle| -\frac{2}{5} < x < \frac{2}{5}\right\}$

C. $\left\{x \middle| x > -\frac{5}{2}\right\}$

D. $\left\{x \middle| x > -\frac{2}{5}\right\}$

E. $\left\{x \middle| x \le -\frac{5}{2}\right\}$

22. Find the domain of the function.

$q(s) = \sqrt{81 - s^2}$

A. all real numbers
B. $s \geq 0$
C. $-9 \leq s \leq 9$
D. $s \leq -9 \text{ or } s \geq 9$
E. $s \leq 9$

23. Use the floor function to write an expression that can be used to round 3.5579 to the nearest thousandths.

$$\frac{\text{int}\left(10^3(3.5579)\right)}{10^3}$$

A.

$$\frac{\text{int}\left(10^3(3.5579)+0.5\right)}{10^3}$$

B.

$$\frac{\text{int}\left(10^2(3.5579)\right)}{10^2}$$

C.

$$\frac{\text{int}\left(10(3.5579)+0.5\right)}{10}$$

D.

$$\frac{\text{int}\left(10^2(3.5579)+0.5\right)}{10^2}$$

E.

24. The amount of federal income tax $T(x)$ an individual owed in 2003 is given by

$$T(x)=\begin{cases}0.10x & \text{if } 0\le x<7000\\ 0.15(x-7000)+700 & \text{if } 7000\le x<28400\\ 0.25(x-28400)+3910 & \text{if } 28400\le x<68800\\ 0.28(x-68800)+14010 & \text{if } 68800\le x<143500\\ 0.33(x-143500)+34926 & \text{if } 143500\le x<311950\\ 0.33(x-311950)+90515 & \text{if } x\ge 311950\end{cases}$$

where *x* is the adjusted gross income tax of the taxpayer. What is the domain of this function? Write answer in interval notation.

A. $[0,\infty)$
B. $[0, 311950]$
C. $(-\infty,\infty)$
D. $[7000, 311950]$
E. $(0, 311950)$

25. The amount of federal income tax $T(x)$ an individual owed in 2003 is given by

$$T(x)=\begin{cases}0.10x & \text{if } 0\le x<7,000\\ 0.15(x-7,000)+700 & \text{if } 7,000\le x<28,400\\ 0.25(x-28,400)+3,910 & \text{if } 28,400\le x<68,800\\ 0.28(x-68,800)+14,010 & \text{if } 68,800\le x<143,500\\ 0.33(x-143,500)+34,926 & \text{if } 143,500\le x<311,950\\ 0.33(x-311,950)+90,515 & \text{if } x\ge 311,950\end{cases}$$

where *x* is the adjusted gross income tax of the taxpayer. Find the income tax owed by an individual whose adjusted gross income was $46,200.

A. $4,450.00
B. $6,580.00
C. $7,071.00
D. $8,360.00
E. $8,894.00

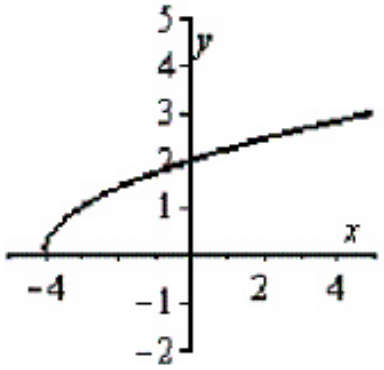
26. The amount of federal income tax $T(x)$ an individual owed in [$year] is given by

$$T(x) = \begin{cases} 0.10x & \text{if } 0 \le x < 7,300 \\ 0.15(x - 7,300) + 730 & \text{if } 7,300 \le x < 29,700 \\ 0.25(x - 29,700) + 4,090 & \text{if } 29,700 \le x < 71,950 \\ 0.28(x - 71,950) + 14,626 & \text{if } 71,950 \le x < 150,150 \\ 0.33(x - 150,150) + 36,549 & \text{if } 150,150 \le x < 326,450 \\ 0.33(x - 326,450) + 94,728 & \text{if } x \ge 326,450 \end{cases}$$

where x is the adjusted gross income tax of the taxpayer. Find the income tax owed by an individual whose adjusted gross income was $99,450.

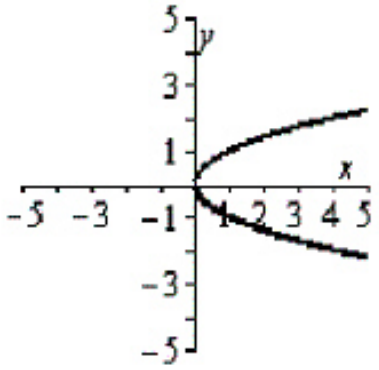
A. $21,501
B. $17,836
C. $19,818
D. $22,326
E. $7,700

27. Use the vertical line test to determine if the following graph is the graph of a function.



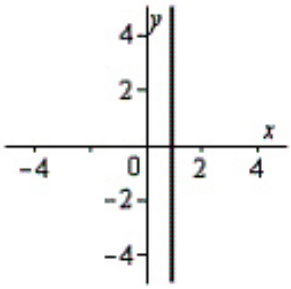
A. function
B. not a function

28. Use the vertical line test to determine if the following graph is the graph of a function.



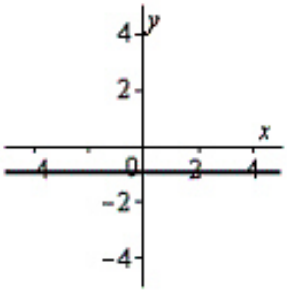
A. not a function
B. function

29. Use the vertical line test to determine if the following graph is the graph of a function.



A. function
B. not a Function

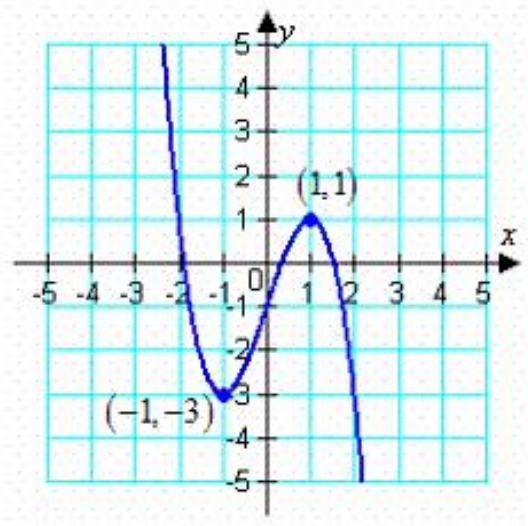
30. Use the vertical line test to determine if the following graph is the graph of a function.



A. not a function
B. function

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

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



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

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

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

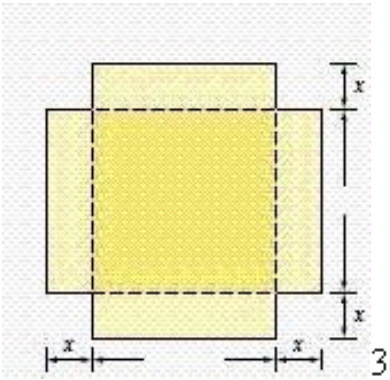
D. decreasing on $(-\infty, -1)$
increasing on $(1, \infty)$

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

32. A car was purchased for $35,000. Assuming the car depreciates at a rate of $4200 per year (*straight-line depreciation*) for the first 6 years, write the value v of the car as a function of the time t (measured in years) for $0 \le t \le 6$.

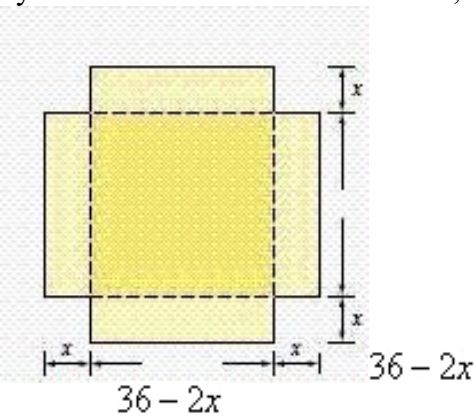
A. $v(t) = 35,000 + 4200t$
B. $v(t) = 35,000 - 4200(6)t$
C. $v(t) = 4200t - 35,000$
D. $v(t) = 35,000 + 4200(6)t$
E. $v(t) = 35,000 - 4200t$

33. An open box is to be made from a square piece of cardboard having dimensions 36 inches by 36 inches by cutting out squares of area x^2 from each corner as shown in the figure below. Express the volume V of the box as a function of x.



A. $V(x) = 1296 - 144x + 4x^2$
B. $V(x) = 1296x - 72x^2 + 4x^3$
C. $V(x) = 36x - 72x^2 + 4x^3$
D. $V(x) = 36x^2 - 2x^3$
E. $V(x) = 1296x - 144x^2 + 4x^3$

34. An open box is to be made from a square piece of cardboard having dimensions 36 inches by 36 inches by cutting out squares of area x^2 from each corner as shown in the figure below. If the volume of the box is given by $V(x) = 1296x - 144x^2 + 4x^3$, state the domain of V.



A. $0 < x < 18$
B. $144 < x < 1296$
C. $0 < x < 36$
D. all real numbers
E. $4 < x < 144$

35. Find the slope of the line that passes through the points $A(4, -1)$ and $B(9, -7)$.

A. $-\frac{11}{10}$
B. $-\frac{8}{13}$
C. $\frac{16}{5}$
D. $-\frac{6}{5}$
E. $\frac{6}{5}$

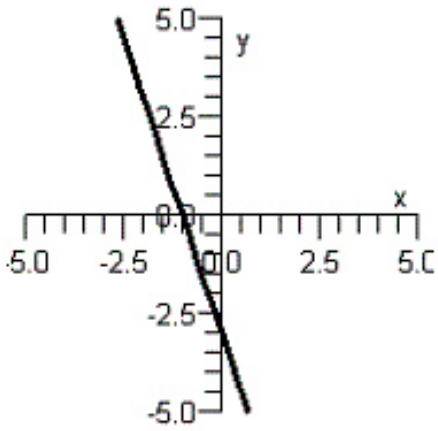
36. Find the slope of the line that passes through the points $(4, 1)$ and $(4, -5)$.

A. –6
B. 6
C. undefined
D. –3
E. 0

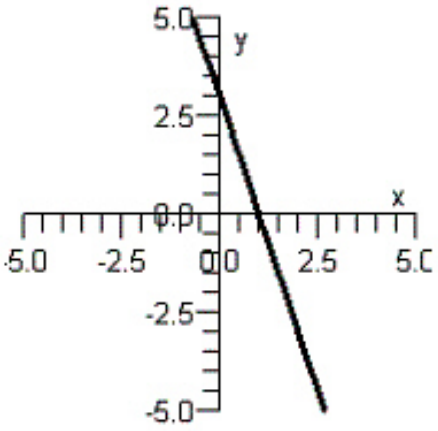
37. Graph y as a function of x by finding the slope and y-intercept of the line below.

$y = 3x - 3$

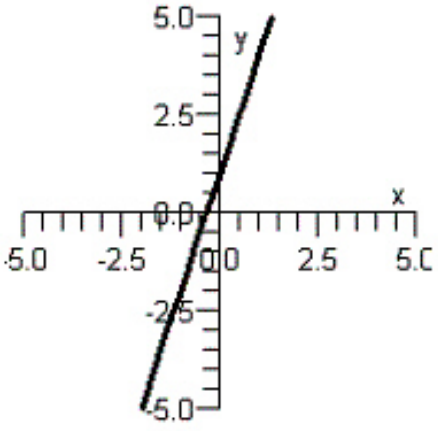
A.



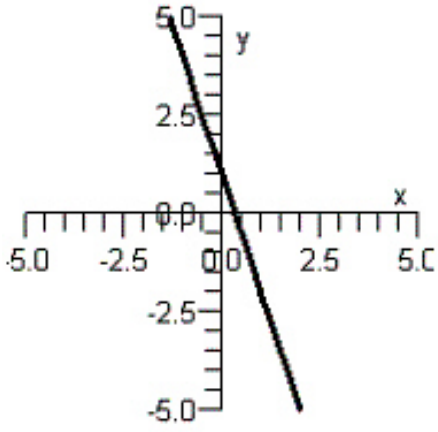
B.

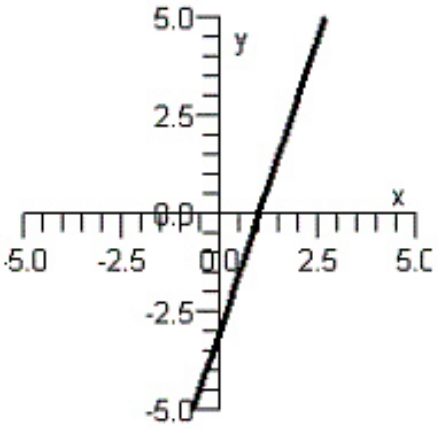


C.



D.





E.

38. Find the equation of the line that has *y*-intercept $(0, 6)$ and slope –4. Write the equation in the form $y = mx + b$.

A. $y = -6x - 4$

B. $y = -4x - 6$

C. $y = -4x + 6$

D. $y = 4x - 6$

E. $y = 6x - 4$

39. Find the value of *x* in the domain of $f(x) = 4x - 3$ for which $f(x) = 13$.

A. 1
B. 6
C. –3
D. 7
E. 4

40. Given the function below, find the solution of $f(x) = 0$.
$f(x) = -10x + 80$

A. 10
B. 8
C. –8
D. –10
E. 70

41. The federal minimum wage, in dollars per hour, for the years 1955 to 2005 is given in the table below. Using the data from 1955 and 1985, find a linear model that predicts the federal minimum wage for the year *t*. Round to nearest hundredth.

Year	Federal Minimum Wage
1955	0.75
1965	1.25
1975	2.10
1985	3.35
1995	4.25
2005	5.15

A. $W(t) = 0.09t - 30$
B. $W(t) = 0.09t - 169.35$
C. $W(t) = -2.60t - 169.35$
D. $W(t) = 2.60t + 30$
E. $W(t) = 3.35t + 30$

42. The federal minimum wage, in dollars per hour, for the years 1955 to 2005 is given in the table below. Using the data from 1955 and 1975, find a linear model (rounding the slope and intercept to 2 decimal places) that predicts the federal minimum wage for the year *t*. Use this model to predict in what year the federal minimum wage will exceed $5.80.

Year	Federal Minimum Wage
1955	0.75
1965	1.25
1975	2.10
1985	3.35
1995	4.25
2005	5.15

A. 2032
B. 2029
C. 2030
D. 2027
E. 2031

43. Determine the profit function, $P(x)$ if the revenue function and cost functions are $R(x) = 229x$ and $C(x) = 94x + 16,740$ respectively. Also find the break-even point.

A. $P(x) = 323x - 16,740$; $x = 52$, the break-even point
B. $P(x) = 135x - 16,740$; $x = 124$, the break-even point
C. $P(x) = 135x + 16,740$; $x = 124$, the break-even point
D. $P(x) = 323x + 16,740$; $x = 52$, the break-even point
E. $P(x) = 323x - 16,740$; $x = 124$, the break-even point

44. A rental car company purchases an automobile for $21,700. The automobile requires an average cost of $6.05 per day in maintenance. Find a linear function that expresses the total cost *C* of owning the automobile after *t* days.

A. $C(t) = 42.35t + 60.00$
B. $C(t) = 6.05t + 21,700$
C. $C(t) = 6.05t - 21,700$
D. $C(t) = 42.35t + 21,700$
E. $C(t) = 6.05t + 60.00$

45. A rental car company purchases an automobile for $22,300. The automobile requires an average cost of $7.85 per day in maintenance. The automobile rents for $45.00 a day. Find a linear function that expresses the total revenue *R* when the automobile has been rented for *t* days.

A. $R(t) = 45.00t$
B. $R(t) = 37.15t$
C. $R(t) = 52.85t$
D. $R(t) = 37.15t + 22,300$
E. $R(t) = 52.85t - 62.00$

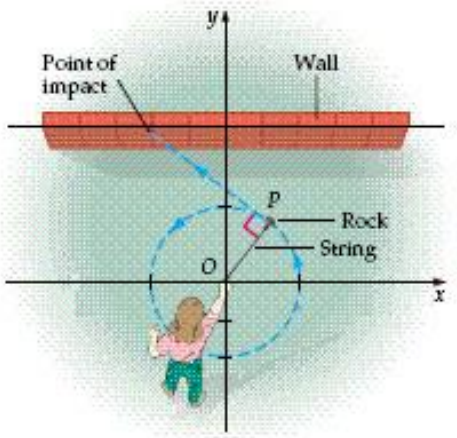
46. A rental car company purchases an automobile for $19,300. The automobile requires an average cost of $7.80 per day in maintenance. The automobile rents for $40.00 a day. The profit after *t* days, $P(t)$ is given by the function $P(t) = R(t) - C(t)$. Find the linear function $P(t)$.

A. $P(t) = 32.20t - 19,300$
B. $P(t) = 47.80t + 54.00$
C. $P(t) = 32.20t + 19,300$
D. $P(t) = 47.80t - 54.00$
E. $P(t) = 40.00t - 19,300$

47. A rental car company purchases an automobile for $18,800. The automobile requires an average cost of $8.40 per day in maintenance. The automobile rents for $60.00 a day. The profit after *t* days, $P(t)$, is given by the function $P(t) = R(t) - C(t)$. After finding the linear function $P(t)$, determine, to the nearest day, how many days it will take the company to break-even assuming the automobile is in use every day.

A. approximately 364 days
B. approximately 320 days
C. approximately 344 days
D. approximately 415 days
E. approximately 275 days

48. A rock attached to a string is whirled horizontally about the origin in a counterclockwise circular path with radius 10 feet. When the string breaks, the rock travels on a linear path perpendicular to the radius *OP* and hits the wall which is $y = 14$ feet away. If the string breaks when the rock is at $P(6, 8)$, find the *x*-coordinate of the point at which the rock hits the wall.



A. –2
B. –1
C. –4
D. –5
E. –3

49. Use the method of completing the square to find the standard form of the quadratic function below. State the vertex and axis of symmetry of the graph of the function.

$f(x) = x^2 + 14x + 42$

A. $f(x) = (x+7)^2 - 7$, vertex $(-7, -7)$, axis of symmetry $x = -7$
B. $f(x) = (x+7)^2 - 7$, vertex $(7, -7)$, axis of symmetry $x = -7$
C. $f(x) = (x-7)^2 + 7$, vertex $(-7, 7)$, axis of symmetry $x = -7$
D. $f(x) = (x+7)^2 - 7$, vertex $(-7, -7)$, axis of symmetry $x = -7$
E. $f(x) = (x-7)^2 + 7$, vertex $(7, 7)$, axis of symmetry $x = 7$

50. Write the quadratic function $f(x) = -x^2 + 2x + 6$ in standard form.

A. $f(x) = -(x+7)^2 - 1$

B. $f(x) = -(x-1)^2 + 7$

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

D. $f(x) = -(x+1)^2 + 7$

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

51. Use the vertex formula to determine the vertex of the graph of $f(x) = x^2 - 2x$ and write the function in standard form.

A. Vertex: $(-1, 1)$; $f(x) = (x-1)^2 + 1$

B. Vertex: $(-1, -1)$; $f(x) = (x+1)^2 + 1$

C. Vertex: $(1, 1)$; $f(x) = (x+1)^2 + 1$

D. Vertex: $(-1, -1)$; $f(x) = (x-1)^2 - 1$

E. Vertex: $(1, -1)$; $f(x) = (x-1)^2 - 1$

52. Find the range of $f(x) = 7x^2 - 12x + 1$.

A. $\left\{ y \middle| y \geq -\frac{29}{7} \right\}$

B. $\left\{ y \middle| y \geq \frac{6}{7} \right\}$

C. $\{ y | y \geq 1 \}$

D. $\{ y | y \geq 0 \}$

E. $\left\{ y \middle| y \geq -\frac{58}{7} \right\}$

53. Find the maximum or minimum value of the function below. State whether this value is a maximum or a minimum.

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

A. –2, a minimum
B. 1, a minimum
C. 2, a maximum
D. –2, a maximum
E. 2, a minimum

54. The sum of the length *l* and the width *w* of a rectangular region is 250 meters. Write *l* as a function of *w*.

A. $l = 250 - w$
B. $w = 250 - l$
C. $l + w = 250$
D. $l = 250 + w$
E. $w = 250 + l$

55. The sum of the length *l* and the width *w* of a rectangular region is 200 meters. Write the area *A* as a function of *w*.

A. $A(w) = w^2 - 200$
B. $A(w) = 200w - w^2$
C. $A(w) = w^2 + 200w$
D. $A(w) = 200 - w$
E. $A(w) = w^2 - 200w$

56. The sum of the length *l* and the width *w* of a rectangular region is 210 meters. Find the dimensions that produce the greatest area.

A. $l = 105;\ w = 105$
B. $l = 95;\ w = 115$
C. $l = 120;\ w = 90$
D. $l = 100;\ w = 115$
E. $l = 110;\ w = 100$

57. An air freight company has determined that the cost, in dollars, of delivering x parcels per flight is $C(x) = 2248 + 8x$. The price per parcel, in dollars, the company charges to send x parcels is $p(x) = 24 - 0.01x$. Determine the revenue function.

A. $R(x) = -0.01x^2 + 24x$
B. $R(x) = -32x^2 + 2247.99$
C. $R(x) = 22.48x^2 + 32x$
D. $R(x) = 2247.99x^2 + 32$
E. $R(x) = -22.48x^2 + 32x$

58. An air freight company has determined that the cost, in dollars, of delivering x parcels per flight is $C(x) = 2169 + 5x$. The price per parcel, in dollars, the company charges to send x parcels is $p(x) = 20 - 0.03x$. Determine the profit function.

A. $P(x) = -0.03x^2 + 15x$
B. $P(x) = -4.97x^2 + 2149x + 20$
C. $P(x) = -5.03x^2 + 20x - 2169$
D. $P(x) = -0.03x^2 + 15x - 2169$
E. $P(x) = -4.97x^2 + 15x - 2169$

59. An air freight company has determined that the cost, in dollars, of delivering x parcels per flight is $C(x) = 2178 + 7x$. The price per parcel, in dollars, the company charges to send x parcels is $p(x) = 25 - 0.02x$. Determine the company's maximum profit to the nearest dollar.

A. $5316
B. $2396
C. $8172
D. $5904
E. $1872

60. An air freight company has determined that the cost, in dollars, of delivering x parcels per flight is $C(x) = 2010 + 6x$. The price per parcel, in dollars, the company charges to send x parcels is $p(x) = 25 - 0.02x$. Determine the price per parcel that yields the maximum profit.

A. $12.75
B. $10.75
C. $15.50
D. $6.00
E. $18.75

61. An air freight company has determined that the cost, in dollars, of delivering x parcels per flight is $C(x) = 1877 + 7x$. The price per parcel, in dollars, the company charges to send x parcels is $p(x) = 25 - 0.02x$. Determine the minimum number of parcels the air freight company must ship to break even.

A. 210 parcels
B. 256 parcels
C. 121 parcels
D. 286 parcels
E. 390 parcels

62. The height in feet of a projectile with an initial velocity of 64 feet per second and an initial height of 50 feet is a function of time t, in seconds, given by $h(t) = -16t^2 + 64t + 50$. Find the maximum height of the projectile.

A. 127 ft
B. 114 ft
C. 121 ft
D. 146 ft
E. 51 ft

63. The height in feet of a projectile with an initial velocity of 224 feet per second and an initial height of 55 feet is a function of time t, in seconds, given by $h(t) = -16t^2 + 224t + 55$. Find the time t when the projectile reaches its maximum height.

A. 9 s
B. 6 s
C. 5 s
D. 8 s
E. 7 s

64. The height in feet of a projectile with an initial velocity of 55 feet per second and an initial height of 58 feet is a function of time *t*, in seconds, given by $h(t) = -16t^2 + 55t + 58$. Find the time *t* when the projectile has a height of 0 feet. Round to nearest tenth of a second.

A. 5.1 s
B. 4.3 s
C. 6.0 s
D. 4.7 s
E. 3.4 s

65. Determine whether the graph of $x = -7y^6 + 11$ is symmetric with respect to the *x*-axis and/or the *y*-axis.

A. symmetric with respect to the *y*-axis
B. symmetric with respect to neither
C. symmetric with respect to both
D. symmetric with respect to the *x*-axis

66. Determine whether the graph of $y = -5x^6 + 2x^3$ is symmetric with respect to the origin.

A. yes
B. no

67. Determine whether $f(x) = x^4 - 5$ is an even function, an odd function, or neither.

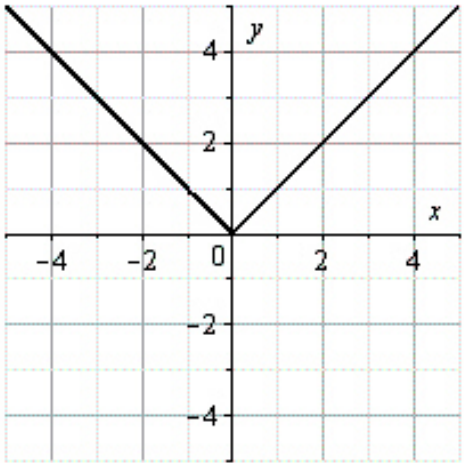
A. even function
B. neither
C. odd function

68. Determine whether $f(x) = x^9 - x^3$ is an even function, an odd function, or neither.

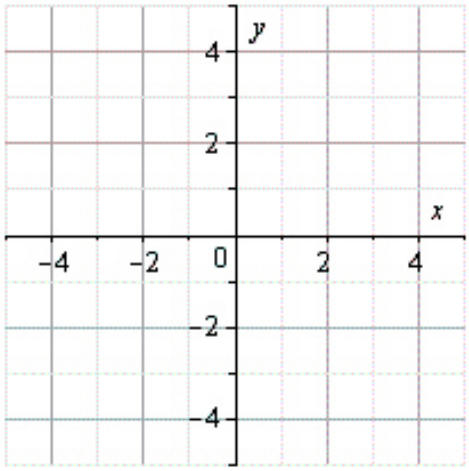
A. even function
B. odd function
C. neither

69. Use the graph of *g,* shown below, to sketch the graph of the function below.

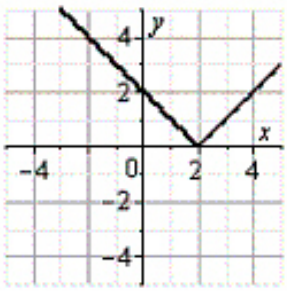
g



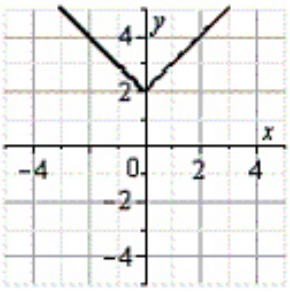
$y = g(x) - 2$



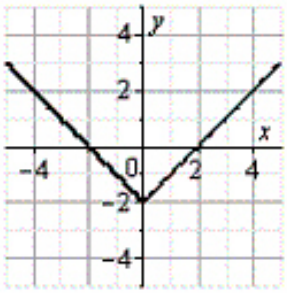
A.


y
x
4
2
-4
0
2
4
-2
-4

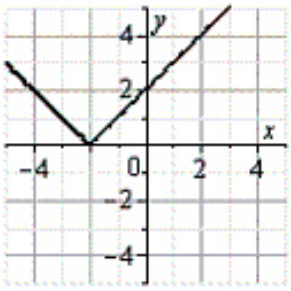
B.


y
x
4
2
-4
0
2
4
-2
-4

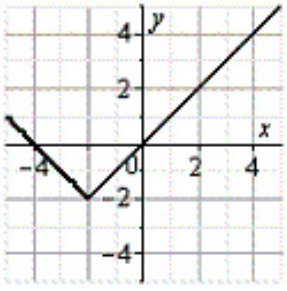
C.


y
x
4
2
-4
0
2
4
-2
-4

D.

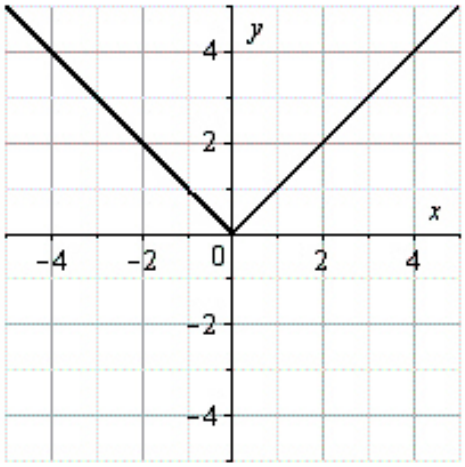

y
x
4
2
-4
0
2
4
-2
-4

E.

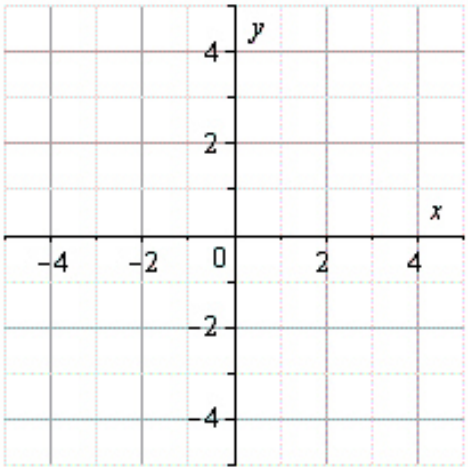

y
x
4
2
-4
0
2
4
-2
-4

70. Use the graph of *g,* shown below, to sketch the graph of the function below.

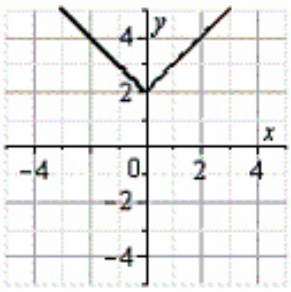
g



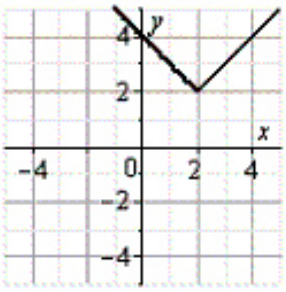
$y = g(x + 2)$



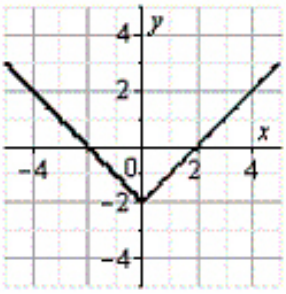
A.


y
x
4
2
0
-2
-4
-4
2
4

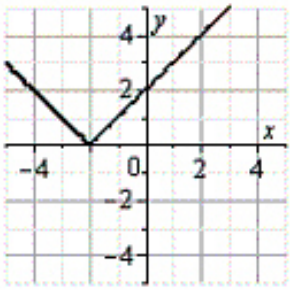
B.


y
x
4
2
0
-2
-4
-4
2
4

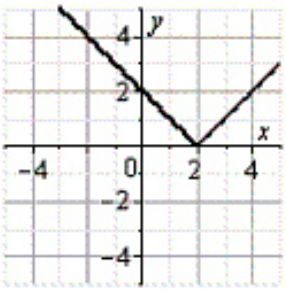
C.


y
x
4
2
0
-2
-4
-4
2
4

D.

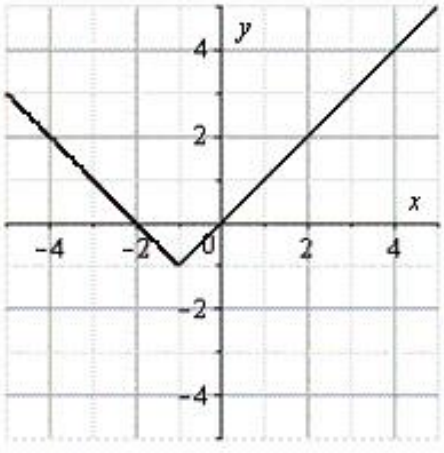

y
x
4
2
0
-2
-4
-4
2
4

E.

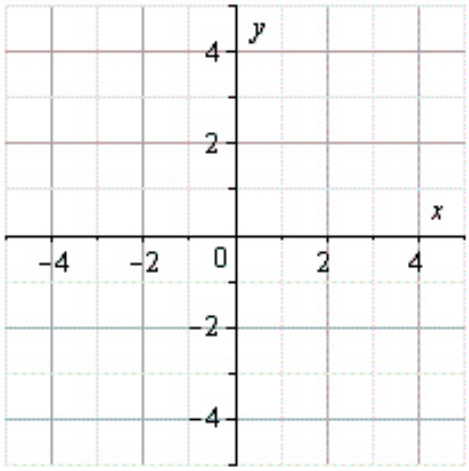

y
x
4
2
0
-2
-4
-4
2
4

71. Use the graph of *E,* shown below, to sketch the graph of the function below.

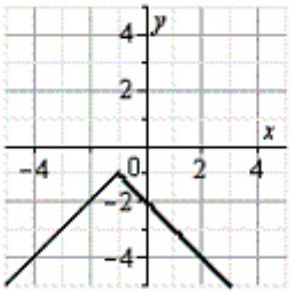
E



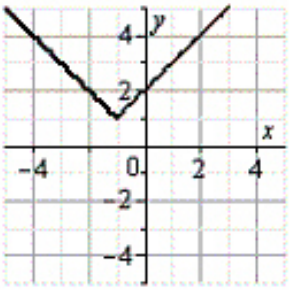
$-E(x)$



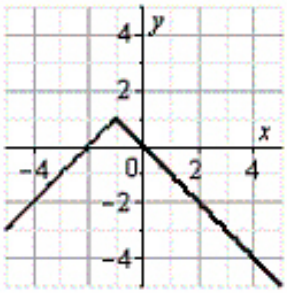
A.



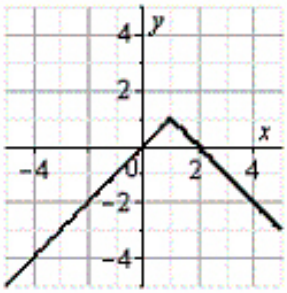
B.



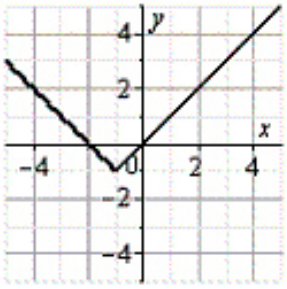
C.



D.

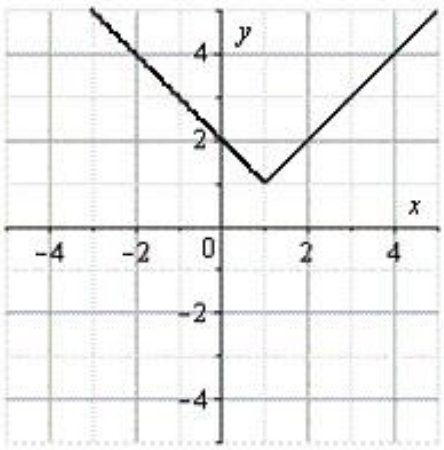


E.

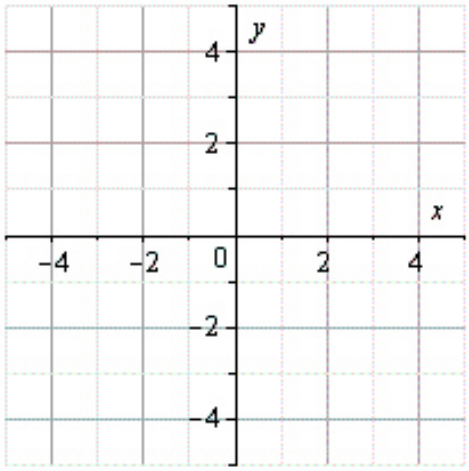


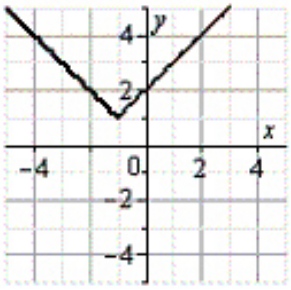
72. Use the graph of *E,* shown below, to sketch the graph of the function below.

E

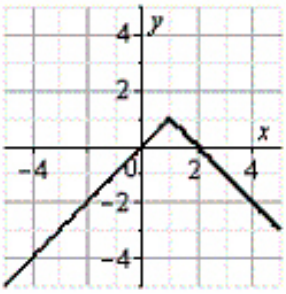


$E(-x)$

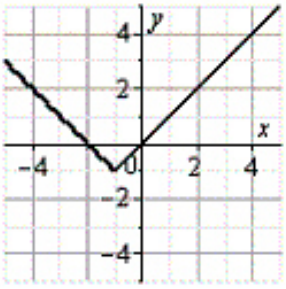



y
x
4
2
0
-2
-4
-4
2
4

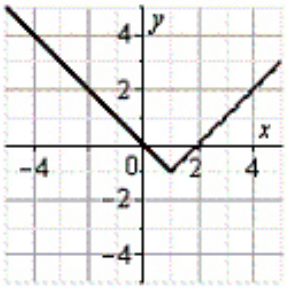
A.


y
x
4
2
0
-2
-4
-4
2
4

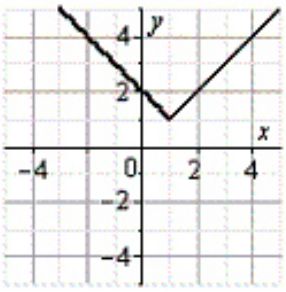
B.


y
x
4
2
0
-2
-4
-4
2
4

C.


y
x
4
2
0
-2
-4
-4
2
4

D.

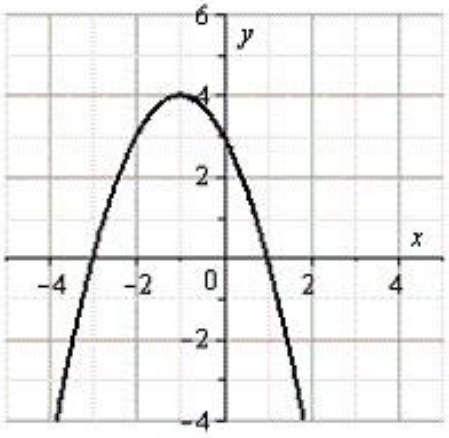

y
x
4
2
0
-2
-4
-4
2
4

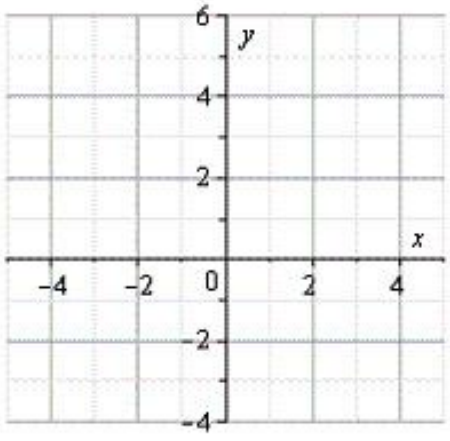
E.

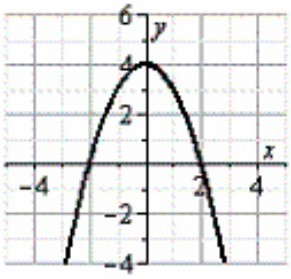
73. Use the graph of *n,* shown below, to sketch the graph of the function below.

n

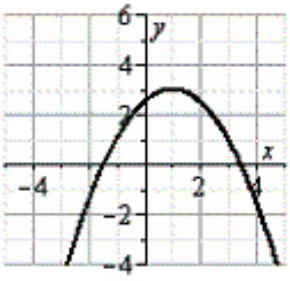
$$y = \frac{1}{2}n(x) + 1$$



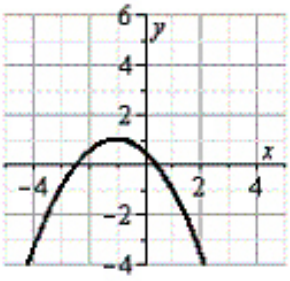



6
y
4
2
x
-4
2
4
-2
-4

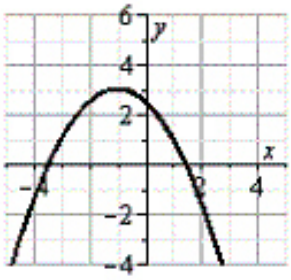
A.


6
y
4
2
x
-4
2
4
-2
-4

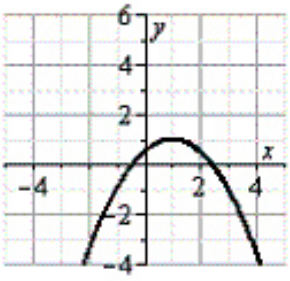
B.


6
y
4
2
x
-4
2
4
-2
-4

C.


6
y
4
2
x
-4
2
4
-2
-4

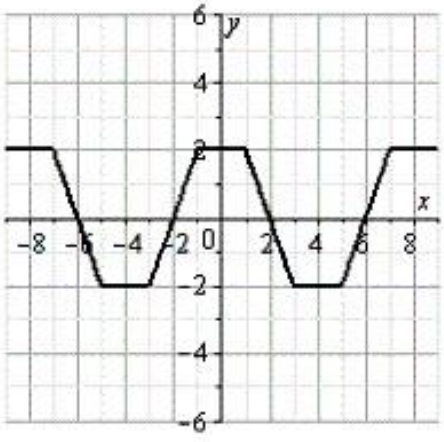
D.


6
y
4
2
x
-4
2
4
-2
-4

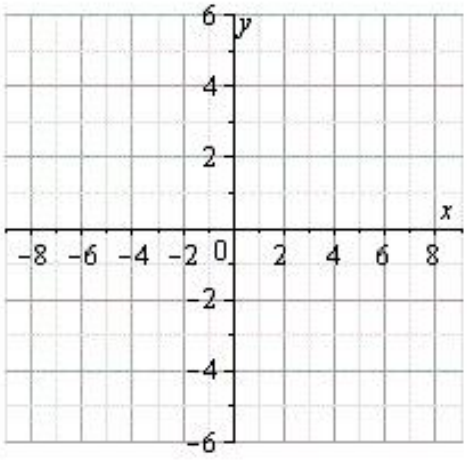
E.

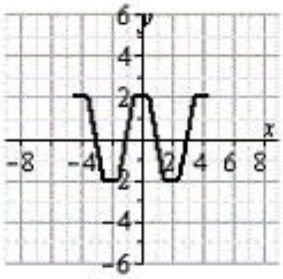
74. Use the graph of $y = g(x)$ shown below, to sketch the graph of the function below.

$y = g(x)$

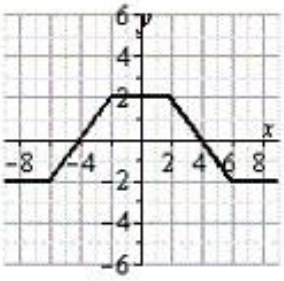


$y = g(2x)$

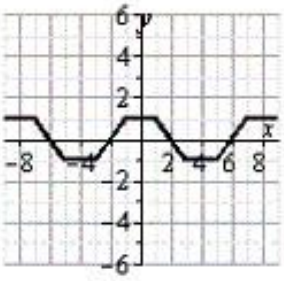



y
x
6
4
2
-2
-4
-6
-8
-4
2
4
6
8

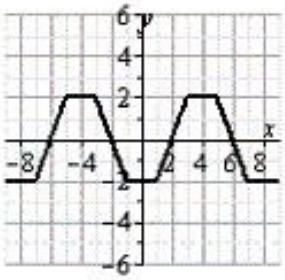
A.


y
x
6
4
2
-2
-4
-6
-8
-4
2
4
6
8

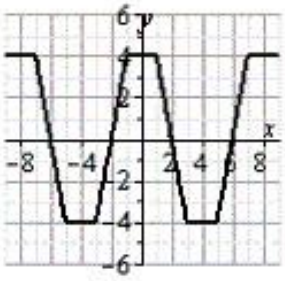
B.


y
x
6
4
2
-2
-4
-6
-8
-4
2
4
6
8

C.


y
x
6
4
2
-2
-4
-6
-8
-4
2
4
6
8

D.


y
x
6
-4
-6
-8
-4
2
4
8

E.

75. Find $(f/g)(x)$.

$f(x) = x^2 - 7x \qquad g(x) = -6 - x$

$(f/g)(x) = \frac{x^2 - 7x}{-6 - x}, x \neq 0$

A.

$(f/g)(x) = -\frac{x^2}{6} + 7, x \neq 0$

B.

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

C.

$(f/g)(x) = \frac{x - 7}{-6}, x \neq 0$

D.

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

E.

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

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

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

A. $(f+g)(x) = 2x^2 + 5x - 1$

B. $(f+g)(x) = -2x^4 - 5x^2 + 1$

C. $(f+g)(x) = 6x^4 + 13x^2 + 5$

D. $(f+g)(x) = 6x^2 + 13x + 5$

E. $(f+g)(x) = -2x^2 - 5x + 1$

77. Find $(fg)(x)$.

$f(x) = \sqrt{2x}$ $\quad$ $g(x) = \sqrt{-3x+6}$

$(fg)(x) = x\sqrt{-6} + 2\sqrt{3x}$

A.

$(fg)(x) = \sqrt{-x+6}$

B.

$(fg)(x) = \sqrt{-6x^2+12x}$

C.

$(fg)(x) = \sqrt{-6x^2+6}$

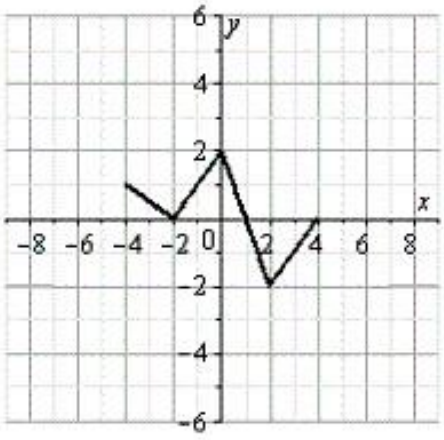
D.

$(fg)(x) = 2x\sqrt{-6+3x}$

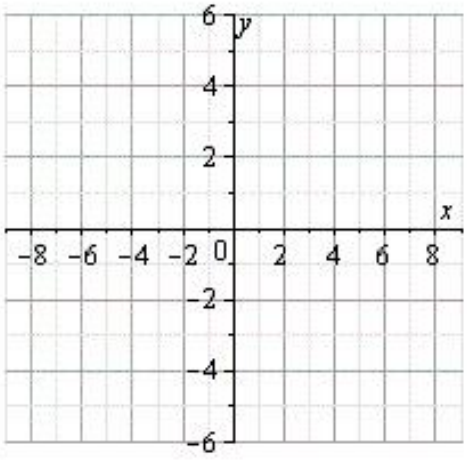
E.

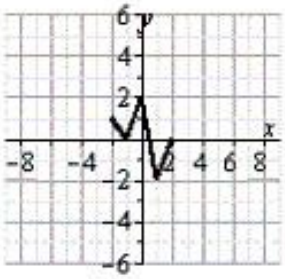
78. Use the graph of $y = g(x)$, shown below, to sketch the graph of the function below.

$y = g(x)$

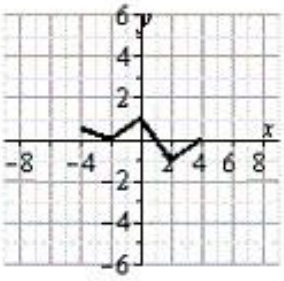


$y = g\left(\frac{1}{2}x\right)$

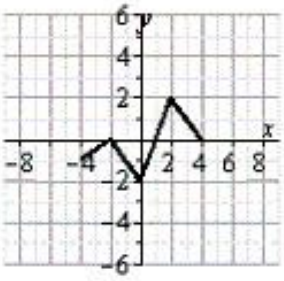



y
x
6
4
2
-8
-4
2
4
6
8
-2
-4
-6

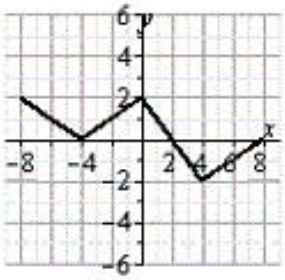
A.


y
x
6
4
2
-8
-4
2
4
6
8
-2
-4
-6

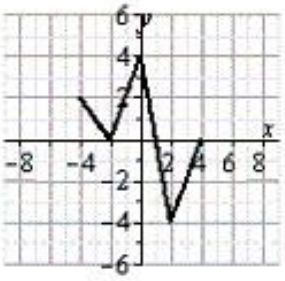
B.


y
x
6
4
2
-8
-4
2
4
6
8
-2
-4
-6

C.


y
x
6
4
2
-8
-4
2
4
6
8
-2
-4
-6

D.


y
x
6
4
-8
-4
2
4
6
8
-2
-4
-6

E.

79. If $f(x) = \sqrt{x-3}$ and $g(x) = -x$, find $f+g$ and state the domain.

A. $(f+g)(x) = \sqrt{x-3} - x$; $\{x | x \geq 3\}$

B. $(f+g)(x) = \sqrt{-2x-3}$; $\{x | x \leq -3\}$

C. $(f+g)(x) = \sqrt{x^2+3x}$; all real numbers

D. $(f+g)(x) = \sqrt{-3}$; $\{x | x = -3\}$

E. $(f+g)(x) = -x\sqrt{x-3}$; $\{x | x \geq 3\}$

80. Evaluate $(f-g)(-2)$ where $f(x) = x^2 - 3x - 18$ and $g(x) = -3x + 8$.

A. –8
B. –6
C. –22
D. –28
E. 6

81. Evaluate $(f+g)(3)$ where $f(x) = x^2 + 6x + 5$ and $g(x) = 5x - 1$.

A. 14
B. 18
C. 32
D. 46
E. 40

82. Evaluate $(fg)(-2)$ where $f(x) = x^2 + 6x - 16$ and $g(x) = -7x - 8$.

A. –144
B. 0
C. 144
D. –344
E. 48

83. Evaluate $\left(\frac{f}{g}\right)(2)$ where $f(x) = x^2 + 8x - 33$ and $g(x) = 3x + 18$.

A. $-\frac{13}{24}$
B. $-\frac{13}{20}$
C. $\frac{5}{6}$
D. $-\frac{29}{24}$
E. $-\frac{5}{8}$

84. Find the difference quotient of $f(x) = -3x - 7$.

A. $-3h$
B. $-3 + h$
C. $\frac{-3h - 14}{h}$
D. –3
E. $\frac{h - 14}{h}$

85. Find the difference quotient of the function $f(x) = 9x^2 - 2$.

A. $18x - h$
B. $18x + h$
C. $18x - 9h$
D. $18x + 9h$
E. $2x + h$

86. Find $f \circ g$.
$f(x) = -3x + 4 \qquad g(x) = x - 8$

A. $(f \circ g)(x) = -3x + 28$
B. $(f \circ g)(x) = -3x - 4$
C. $(f \circ g)(x) = -4x - 4$
D. $(f \circ g)(x) = -3x^2 + 28x - 32$
E. $(f \circ g)(x) = -4x + 12$

87. Find $g \circ f$.
$f(x) = x + 5 \qquad g(x) = x^2$

A. $(g \circ f)(x) = x^2 + 25$
B. $(g \circ f)(x) = x^2 - 25$
C. $(g \circ f)(x) = x^2 + 5$
D. $(g \circ f)(x) = x^2 + 10x + 25$
E. $(g \circ f)(x) = x^2 + 5x + 25$

88. Find $f \circ g$.

$f(x) = \left|x^2+4\right|$ $\quad g(x) = 5 - x$

A. $(f \circ g)(x) = 5 - \left|x^2+4\right|$

B. $(f \circ g)(x) = \left|1-x^2\right|$

C. $(f \circ g)(x) = \left|x^2-10x+29\right|$

D. $(f \circ g)(x) = \left|9-x^2\right|$

E. $(f \circ g)(x) = \left|x^2+29\right|$

89. Find the difference quotient of the function $f(x) = 8x^2 + 3x + 8$.

A. $16x + 8h + 3$
B. $16x - h$
C. $16x + 8h$
D. $16x + h$
E. $16x - 8h$

90. Evaluate the following composite function if $f(x) = 3x + 4$ and $g(x) = x^2 - 10$.
$(f \circ g)(2)$

A. 6
B. 112
C. –8
D. 2
E. –14

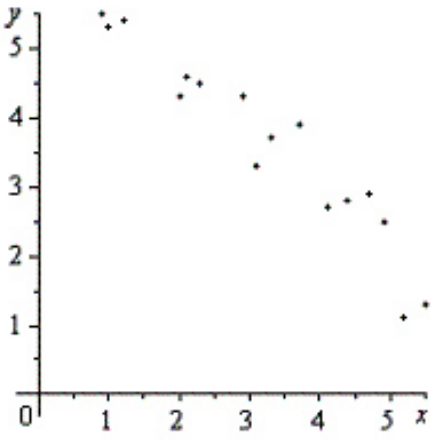
91. A water tank has the shape of a right circular cone with height 12 feet and radius 8 feet. Water is running into the tank so that the radius r (in feet) of the surface of the water is given by $r = 0.75t$ where t is the time (in minutes) that the water has been running. The volume V of the water is given by

$$V = \frac{1}{3}\pi r^2 h$$

Find $V(t)$ and use it to determine the volume of the water when $t = 5$ minutes. Round to the nearest tenth.

A. 22.1 cubic feet
B. 36.8 cubic feet
C. 49.1 cubic feet
D. 14.7 cubic feet
E. 82.8 cubic feet

92. Determine whether the following scatter diagram suggests a linear relationship between x and y, a nonlinear relationship between x and y, or no relationship between x and y.



A. no relationship between x and y
B. nonlinear relationship between x and y
C. linear relationship between x and y

93. Determine for which scatter diagram, **A** or **B**, the coefficient of determination is closer to 1.

Diagram A

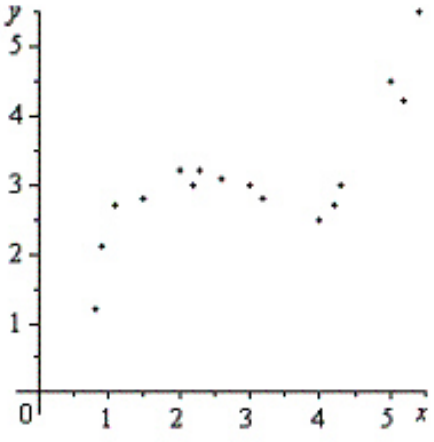
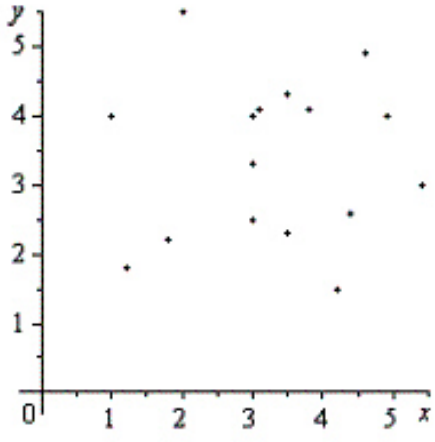


Diagram B



A. Diagram A
B. Diagram B

94. Find the linear regression equation for the set of data given below.
$\{(3, 6), (4, 9), (6, 10), (8, 13), (11, 16)\}$

A. $y = 1.174757x + 3.281553$
B. $y = 1.452434x + 3.490265$
C. $y = 1.28002x + 3.386817$
D. $y = 0.964231x + 3.597343$
E. $y = 1.038641x + 3.214403$

95. Find a quadratic regression model for the data below.
$\{(-3,4.1),(-1,-2.1),(0,-4.3),(1,4.6),(2,6.1)(3,8)\}$

A. $y = 0.5904761905x^2 + 1.497142857x - 0.4276190476$
B. $y = 0.8357142857x^2 + 1.077142857x - 0.9685714286$
C. $y = 1.414285714x^2 + 1.954285714x - 2.705714286$
D. $y = 0.7619047619x^2 + 2.401428571x - 2.264761905$
E. $y = 0.6071428571x^2 + 0.1442857143x + 1.54$

96. Suppose the average remaining lifetime for women in a given country is given in the following table.

Age	*Years*
5	76.3
10	70.7
20	61.7
30	52.7
40	43.9

Compute the linear regression equation for these data, where x is the age, in years, and A is the remaining lifetime, in years. Round parameters to the nearest hundredth.

A. $A(x) = -8.28x + 63.81$

B. $A(x) = -8.28x + 85.90$

C. $A(x) = -0.92x + 85.90$

D. $A(x) = -8.28x + 80.31$

E. $A(x) = -0.92x + 80.31$

97. Suppose the average remaining lifetime for women in a given country is given in the following table.

Age	*Years*
5	67.6
20	56.4
25	51.4
45	34.2
65	19.0

Find the linear regression equation for these data, whose parameters are rounded to the nearest hundredth, where x is the age, in years, and A is the remaining lifetime, in years. Use the regression equation to estimate the remaining lifetime for a 24-year old woman.

A. 53.96 years
B. 58.88 years
C. 48.22 years
D. 51.5 years
E. 46.58 years

98. The table below gives the wingspan, in centimeters, and the average observed flying speeds, in knots, of various birds.

Species	**Wingspan (cm)**	**Flying Speed (knots)**
House Martin	28	30
Swallow	31	33
Thrush	45	34
Carrion Crow	49	35
Jackdaw	50	32

Based on these data, what is the flying speed of a Starling whose wingspan is 35 centimeters? Do not round any values in your calculations but round the final answer to the nearest knot.

A. 33
B. 31
C. 32
D. 35
E. 34

99. The fuel efficiency, in miles per gallon, for a certain midsize car at various speeds, in miles per hour, is given in the table below.

mph	mpg	mph	mpg
25	25	55	30
30	31	60	26
35	36	65	24
40	35	70	15
45	32	75	12
50	33		

Find a quadratic model for these data.

A. $y = -0.0225174825x^2 + 1.915384615x - 6.664335664$

B. $y = -0.0165034965x^2 + 1.366713287x + 5.685314685$

C. $y = -0.0344055944x^2 + 3.662377622x - 55.77622378$

D. $y = -0.0280652681x^2 + 2.897435897 - 38.32867133$

E. $y = -0.0258741259x^2 + 2.578321678x - 28.03496503$

100. The fuel efficiency, in miles per gallon, for a certain midsize car at various speeds, in miles per hour, is given in the table below.

mph	mpg	mph	mpg
25	20	55	31
30	24	60	33
35	32	65	30
40	35	70	24
45	36	75	22
50	40		

Find a quadratic model for these data and use it to predict the fuel efficiency of this car when it is traveling at a speed of 40 mph. Do not round any values in your calculations but round the final answer to the nearest tenth.

A. 32.7 mpg
B. 34.9 mpg
C. 33.7 mpg
D. 33.9 mpg
E. 35.7 mpg

101. The table below shows the velocities, in feet per second, of a ball that is thrown horizontally from the top of a 50 foot building and the distances, in feet, that it lands from the base of the building. Compute the linear regression equation for these data.

Velocity (ft/sec)	Distance (ft)
10	32
15	45
20	72
25	85
30	90
40	110
50	170

A. $y = 2.944432432x - 0.7139459459$
B. $y = 3.028222013x - 1.079962371$
C. $y = 3.073502956x + 2.338987407$
D. $y = 3.02463355x + 3.626221498$
E. $y = 3.156886228x + .5988023952$

102. The table below shows the velocities, in feet per second, of a ball that is thrown horizontally from the top of a 50 foot building and the distances, in feet, that it lands from the base of the building. Compute the linear regression equation for these data, rounding to 5 decimal places, and then using this model, find the expected distance a ball will travel when the velocity is 53 feet per second. Round your final answer to the nearest foot.

Velocity (ft/sec)	Distance (ft)
15	48
25	80
29	100
33	95
38	112
40	130
48	150

A. 167
B. 170
C. 164
D. 169
E. 166