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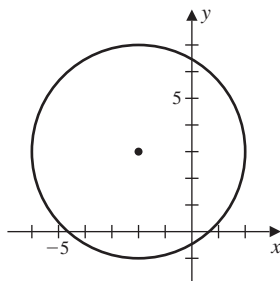
Chapter 1 Form A: Test

1. Use interval notation to list the values of x that satisfy the inequality $x^2 - 3x + 2 \leq 0$.
2. Find all values of x that solve the equation $|6x - 3| = 9$.
3. Solve the inequality $|x - 3| \geq 2$ and write the solution using interval notation.
4. Consider the points $P_1(2, 4)$ and $P_2(-1, 3)$
 - (a) Find the distance between P_1 and P_2 .
 - (b) Find the midpoint of the line segment joining P_1 and P_2 .
5. Indicate on the xy -plane the points (x, y) for which the statement

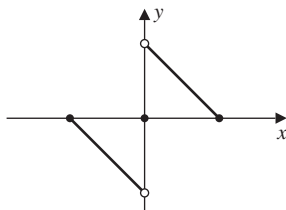
$$|x - 1| < 3 \quad \text{and} \quad |y + 1| < 2$$

holds.

6. Find the equation of the circle shown in the figure.



7. Consider the circle with equation $x^2 + 2x + y^2 - 4y = -4$.
 - (a) Find the center of the circle.
 - (b) Find the radius of the circle.
8. Specify any axis or origin symmetry of the graph.

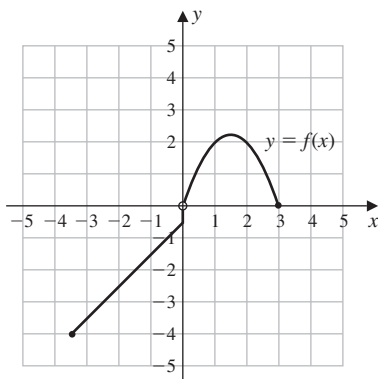


9. Consider the equation $y = x^3 + 8$.
 - (a) Determine any axis intercepts of the equation.
 - (b) Describe any axis or origin symmetry of the equation.
10. Find the distance between the points of intersection of the graphs $y = x^2 + 2$ and $y = 6$.

11. Suppose $f(x) = 4x^2 + 1$. Find the following values.

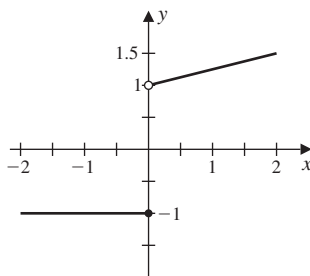
- (a) $f(2)$ (c) $f(2 + \sqrt{3})$ (e) $f(2x)$ (g) $f(x + h)$
 (b) $f(\sqrt{3})$ (d) $f(2) + f(\sqrt{3})$ (f) $f(1 - x)$ (h) $f(x + h) - f(x)$

12. The graph of the function f is given in the figure.



- (a) Determine the value of $f(-2)$. (d) Determine the value of $f(3)$.
 (b) Determine the value of $f(0)$. (e) Determine the domain of the function f .
 (c) Determine the value of $f(2)$. (f) Determine the range of the function f .

13. Consider the following graph.

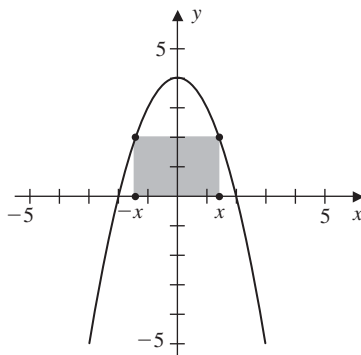


- (a) Use the graph to determine the domain of the function.
 (b) Use the graph to determine the range of the function.

14. Find the domain of each function.

- (a) $f(x) = 3x + 1$ (c) $f(x) = \sqrt{3x + 1}$
 (b) $f(x) = \frac{1}{3x + 1}$ (d) $f(x) = \frac{1}{\sqrt{3x + 1}}$

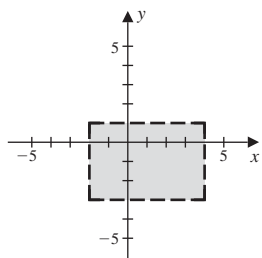
15. Suppose that $f(x) = 2x - 4$.
- (a) Find $f(x + h)$. (b) Find $f(x + h) - f(x)$.
- (c) Find $\frac{f(x+h)-f(x)}{h}$ when $h \neq 0$.
- (d) Find the value that $\frac{f(x+h)-f(x)}{h}$ approaches as $h \rightarrow 0$.
16. Express the area A of an equilateral triangle as a function of x if the side length is $3x$.
17. Find the equation of the line that passes through the point $(2, 3)$ and has slope -2 .
18. Find the slope-intercept form of the equation of the line that passes $(0, 0)$ through and is parallel to $y = 2x + 1$.
19. Find the slope-intercept equation of the line that has x -intercept -2 and y -intercept -3 .
20. A new computer workstation costs \$10,000. Its useful lifetime is 4 years, at which time it will be worth an estimated \$2000. The company calculates its depreciation using the linear decline method that is an option in the tax laws. Find the linear equation that expresses the value V of the equipment as a function of time t , for $0 \leq t \leq 4$.
21. Consider the parabola with equation $y = x^2 - 4x + 3$.
- (a) Determine the vertex of the parabola.
- (b) Sketch the graph of the parabola.
22. Suppose that $f(x) = -x^2 + 6x - 8$.
- (a) Express the quadratic in standard form. (c) Find the maximum value of the function.
- (b) Find any axis intercepts. (d) Find the minimum value of the function.
23. Find the domain of the function described by $f(x) = \sqrt{x^2 - 3}$.
24. A rectangle is inscribed beneath the parabola with equation $y = 4 - x^2$. Express the area of the rectangle as a function of x .



25. Consider the parabola with equation $y = (x - 3)^2$.
- (a) Determine the vertex of the parabola.
- (b) Sketch the graph of the parabola.

Chapter 1 Form A: Answers

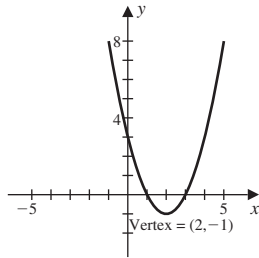
1. $[1, 2]$
2. $x = -1, x = 2$
3. $(-\infty, 1] \cup [5, \infty)$
4. $d = \sqrt{10}$, midpoint = $\left(\frac{1}{2}, \frac{7}{2}\right)$
- 5.



6. $(x + 2)^2 + (y - 3)^2 = 16$
7. center: $(-1, 2)$; radius: 1
8. origin
9. (a) $(-1, 0)$ and $(0, 1)$
(b) none
10. 4
11. (a) 17 (d) 30 (g) $4x^2 + 8xh + 4h^2 + 1$
(b) 13 (e) $16x^2 + 1$ (h) $8xh + 4h^2$
(c) $29 + 16\sqrt{3}$ (f) $5 - 8x + 4x^2$
12. (a) -2.5 (c) 2 (e) $[-3.5, 3]$
(b) -0.5 (d) 0 (f) $[-4, 0) \cup (0, 2.25]$
13. domain: $(-\infty, \infty)$; range: $(1, \infty) \cup \{-1\}$
14. (a) $(-\infty, \infty)$ (c) $\left[-\frac{1}{3}, \infty\right)$
(b) $\left(-\infty, -\frac{1}{3}\right) \cup \left(-\frac{1}{3}, \infty\right)$ (d) $\left(-\frac{1}{3}, \infty\right)$
15. (a) $2x + 2h - 4$ (b) $2h$ (c) 2 (d) 2
16. $A = \frac{9\sqrt{3}}{4}x$
17. $y = -x + 5$
18. $y = 2x$
19. $y = -\frac{3}{2}x - 3$

20. $V = 10,000 - 2,000t$

21.

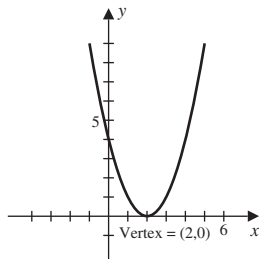


22. $f(x) = -(x - 3)^2 + 1$; intercepts: $x = 4$, $x = 2$, $y = -8$; maximum: 1 at $x = 3$; minimum: none

23. $(-\infty, -\sqrt{3}] \cup [\sqrt{3}, \infty)$

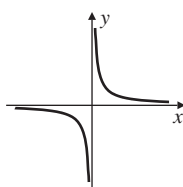
24. $A(x) = 8x - 2x^3$

25.



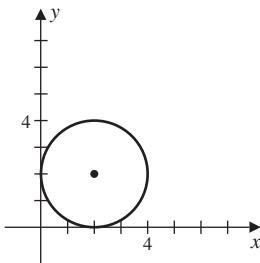
Chapter 1 Form B: Test

- Express the surface area S of a cube as a function of its volume.
- Use interval notation to list the values of x that satisfy the inequality $(x - 1)(x + 2)(x - 2) \geq 0$.
- Find a function whose graph is a parabola with vertex $(1, 3)$ and that passes through the point $(-2, 5)$.
- Find the slope-intercept form of the equation of the line that passes through the point $(1, 1)$ and is parallel to the line $y = \frac{1}{2}x + 2$.
- Specify any axis or origin symmetry of the graph that is shown.

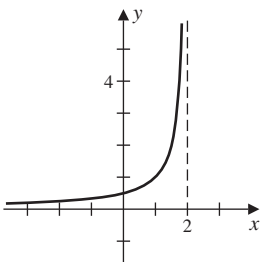


- Determine any axis intercepts and describe any axis or origin symmetry for the graph of $y = 2 - 2x^2$.
- A new computer workstation costs \$10,000. Its useful lifetime is 4 years, at which time it will be worth an estimated \$2000. The company calculates its depreciation using the linear decline method that is an option in the tax laws. Find the linear equation that expresses the value V of the equipment as a function of time t , for $0 \leq t \leq 4$.
- Indicate on the xy -plane those points (x, y) for which the statement $-2 < x < 2$ and $1 < y < 3$ holds.
- Consider the parabola with equation $y = x^2 - 4x + 3$
 - Determine the vertex of the parabola.
 - Sketch the graph of the parabola.
- Find the domain of each function.
 - $f(x) = \frac{x}{x^2 - 1}$
 - $f(x) = \frac{x + 1}{x^2 - 1}$
 - $f(x) = \sqrt{\frac{x^2}{x^2 - 1}}$
- Find the slope-intercept equation of the line that has x -intercept -2 and y -intercept -3 .

12. Find the equation of the circle shown in the figure.

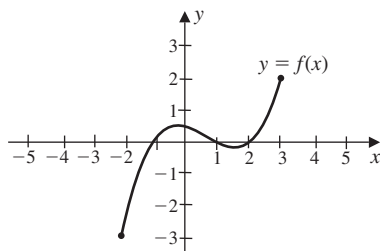


13. Find the distance between the points of intersection of the graphs $y = x^2 + 5$ and $y = 6$.
14. Let $f(x) = -x^2 + 6x - 8$.
- Express the quadratic in standard form.
 - Find any axis intercepts.
 - Find the maximum of the function.
 - Find the minimum of the function.
15. Find the domain of the function $f(x) = \sqrt{x - 2} + 2$.
16. Solve the inequality $|x + 2| \leq 1$ and write the solution using interval notation.
17. Use the graph to determine the domain and range of the function.



18. Consider $f(x) = 7x + 4$.
- Find $f(x + h)$.
 - Find $f(x + h) - f(x)$.
 - Find $\frac{f(x + h) - f(x)}{h}$ where $h \neq 0$.
 - Find what $\frac{f(x + h) - f(x)}{h}$ approaches as $h \rightarrow 0$.
19. Complete the square on the x and y terms to find (a) the center and (b) the radius of the circle with equation $x^2 + 4x + y^2 + 6y + 9 = 0$.

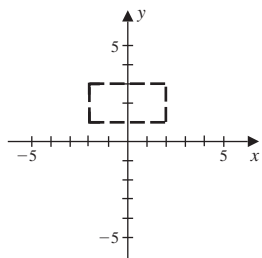
20. Find all values of x that solve the equation $|2x + 3| = 1$.
21. If $f(x) = 4x^2 + 1$, find exact solutions for the following values.
- (a) $f(2)$
 - (b) $f(\sqrt{3})$
 - (c) $f(2 + \sqrt{3})$
 - (d) $f(2) + f(\sqrt{3})$
 - (e) $f(2x)$
 - (f) $f(1 - x)$
 - (g) $f(x + h)$
 - (h) $f(x + h) - f(x)$
22. The graph of the function of f is given in the figure.



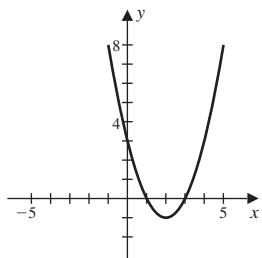
- (a) Determine the value $f(-2)$.
 - (b) Determine the value $f(0)$.
 - (c) Determine the value $f(2)$.
 - (d) Determine the value $f(3)$.
 - (e) Determine the domain of the function.
 - (f) Determine the range of the function.
23. Consider the points $(3, 1)$ and $(-1, -2)$.
- (a) Find the distance between the points.
 - (b) Find the midpoint of the line segments joining the points.
24. Find equation of the line that pass through the point $(-1, -6)$ and have the slope -2 .
25. Consider the parabola with equation $y = (x - 1)^2 + 1$.
- (a) Determine the vertex of the parabola.
 - (b) Sketch the graph of the parabola.

Chapter 1 Form B: Answers

1. $S = 6V^{\frac{2}{3}}$
2. $[-2, 1] \cup [2, \infty)$
3. $y = \frac{2}{9}(x - 1)^2 + 3$
4. $y = \frac{1}{2}x + \frac{1}{2}$
5. origin symmetry
6. intercepts: $(1, 0), (-1, 0), (0, 2)$; symmetry: y -axis
7. $V = 10,000 - 2,000t$
- 8.

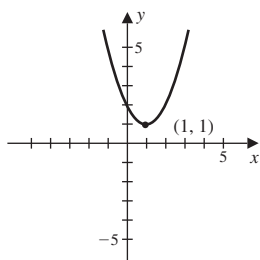


9. (a) $(2, -1)$
- (b)



10. (a) $(-\infty, -1) \cup (-1, 1) \cup (1, \infty)$
- (b) $(-\infty, -1) \cup (-1, 1) \cup (1, \infty)$
- (c) $(-\infty, -1) \cup (1, \infty)$
11. $y = -\frac{3}{2}x - 3$
12. $(x - 2)^2 + (y - 2)^2 = 4$
13. $d = 2$
14. $f(x) = -(x - 3)^2 + 1$; intercepts: $x = 4, x = 2, y = -8$; maximum: 1 at $x = 3$; minimum: none
15. $[2, \infty)$
16. $[-3, -1]$
17. (a) domain: $(-\infty, 2)$ (b) range: $(0, \infty)$

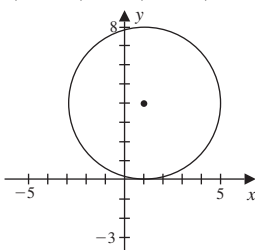
18. (a) $7x + 7h + 4$
(b) $7h$
(c) 7
(d) 7
19. center: $(-2, -3)$; radius: 2
20. $x = -1$ or $x = -2$
21. (a) $f(2) = 17$
(b) $f(\sqrt{3}) = 13$
(c) $f(2 + \sqrt{3}) = 29 + 16\sqrt{3}$
(d) $f(2) + f(\sqrt{3}) = 30$
(e) $f(2x) = 16x^2 + 1$
(f) $f(1 - x) = 5 - 8x + 4x^2$
(g) $f(x + h) = 4x^2 + 8xh + 4h^2 + 1$
(h) $f(x + h) - f(x) = 8xh + 4h^2$
22. (a) $f(-2) = -3$
(b) $f(0) = \frac{1}{2}$
(c) $f(2) = 0$
(d) $f(3) = 2$
(e) domain: $[-2, 3]$
(f) range: $[-3, 2]$
23. $d = 5$; midpoint: $\left(1, -\frac{1}{2}\right)$
24. $y = -2x - 8$
25. (a) $(1, 1)$
(b)



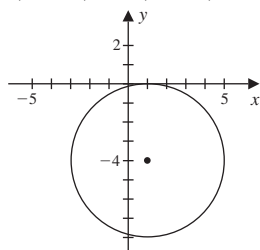
Chapter 1 Form C: Test

- Express the interval $[-2, \infty)$ using inequalities.
 (A) $-2 < x$ (B) $x \leq -2$ (C) $-2 \leq x$ (D) $-3 < x$ (E) $x < -2$
- Express the inequality $-1 \leq x < 2$ using interval notation.
 (A) $[-1, 2)$ (B) $(-\infty, 1) \cup [2, \infty)$ (C) $(-1, 2]$ (D) $(-\infty, 1] \cup (2, \infty)$ (E) $(-1, 2)$
- Find the distance between the points 3 and 7, and the midpoint of the line segment connecting them.
 (A) $d = 4$, midpoint: 2 (B) $d = 10$, midpoint: 2 (C) $d = 4$, midpoint: 5
 (D) $d = 10$, midpoint: 2 (E) $d = 5$, midpoint: 5
- Use interval notation to list the values of x that satisfy the inequality $2x - 2 \geq 8$.
 (A) $(-\infty, 5]$ (B) $[3, \infty)$ (C) $(-\infty, 3]$ (D) $[5, \infty)$ (E) $(5, \infty)$
- Use interval notation to list the values of x that satisfy the inequality $x^2 - 2x - 3 > 0$.
 (A) $(-1, 3)$ (B) $(-3, 1)$ (C) $[-1, 3]$ (D) $(-\infty, -1] \cup [3, \infty)$ (E) $(-\infty, -1) \cup (3, \infty)$
- Find the distance between the points $(-1, 5)$ and $(7, 9)$, and the midpoint of the line segment joining the points.
 (A) $4\sqrt{5}, (6, 14)$ (B) $4\sqrt{5}, (3, 7)$ (C) $16\sqrt{5}, (3, 7)$ (D) $4\sqrt{5}, (2, 8)$ (E) $16\sqrt{5}, (2, 8)$
- Find the standard form of the equation of the circle with center $(1, -4)$ and radius 4, and sketch the graph.

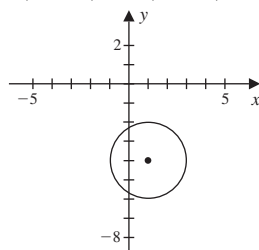
$(x - 1)^2 + (y - 4)^2 = 16$ $(x - 1)^2 + (y + 4)^2 = 16$ $(x - 1)^2 + (y + 4)^2 = 4$ $(x - 1)^2 + (y - 4)^2 = 4$



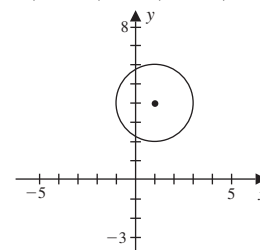
(A)



(B)

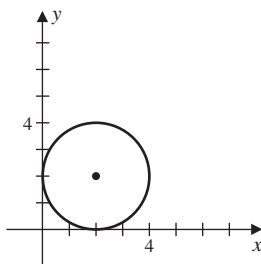


(C)



(D)

- Find the equation of the circle shown in the figure.

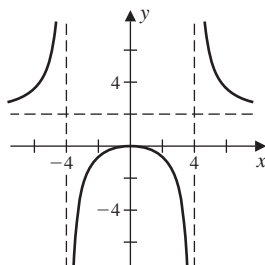


- (A) $x^2 + (y - 2)^2 = 2$ (B) $x^2 + y^2 = 4$ (C) $(x - 2)^2 + (y - 2)^2 = 2$ (D) $(x + 2)^2 + (y + 2)^2 = 4$
 (E) $(x - 2)^2 + (y - 2)^2 = 4$

9. Complete the square on the x and y terms in $x^2 - 2x + y^2 + 4y - 4 = 0$ to find the center and radius of the circle.

- (A) the center is $(1, -2)$ and the radius is 3 (B) the center is $(-1, 2)$ and the radius is 9
 (C) the center is $(1, -2)$ and the radius is 9 (D) the center is $(-1, 2)$ and the radius is 3
 (E) the center is $(1, 2)$ and the radius is 3

10. Use the graph to determine the range of the function.



- (A) $(-\infty, -4) \cup (4, \infty)$ (B) $(-\infty, 0) \cup (1, \infty)$ (C) $(-\infty, -4] \cup [4, \infty)$ (D) $(-\infty, 0) \cup (2, \infty)$
 (E) $(-\infty, 0] \cup (2, \infty)$
11. Find the range of $f(x) = x^2 - 2x + 1$.
- (A) $[1, \infty)$ (B) $[0, \infty)$ (C) $(-\infty, 0]$ (D) $(1, \infty)$ (E) $(0, \infty)$
12. Find the value

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

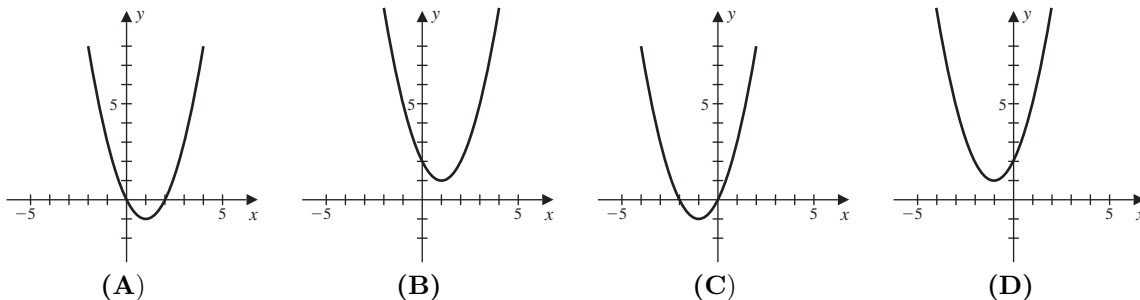
approaches as $h \rightarrow 0$ when $f(x) = 4x^2 + 3x + 1$.

- (A) $8x + 3$ (B) $12x + 3$ (C) $14x + 5$ (D) $4x + 3$ (E) $8x + 5$
13. The height h of a right circular cylinder is five times the radius r . Express the volume as a function of r .
- (A) $5\pi r^2$ (B) $5\pi r^4$ (C) $10\pi r^4$ (D) $5\pi r^3$ (E) $4\pi r^3$
14. Express the area of an equilateral triangle as a function of the length, $4x$, of a side.
- (A) $8\sqrt{3}x^2$ (B) $8\sqrt{3}x^2$ (C) $4\sqrt{3}x^3$ (D) $4x^2$ (E) $4\sqrt{3}x^2$
15. Find an equation of the line that passes through the point $(3, 7)$ and has slope -2 .
- (A) $y = -2x$ (B) $y = -2x - 13$ (C) $y = -2x + 13$ (D) $y = -2x + 1$ (E) $y = -2x - 1$
16. Find the slope-intercept equation of the line that passes through $(-2, 4)$ with slope 3.
- (A) $y = -3x + 2$ (B) $y = 3x + 10$ (C) $y = 3x - 10$ (D) $y = 3x + 2$ (E) $y = 3x$
17. Find the slope-intercept equation of the line that passes through $(4, 3)$ and is parallel to $2x - 3y = 2$.
- (A) $y = \frac{2}{3}x - \frac{11}{3}$ (B) $y = \frac{2}{3}x + \frac{1}{3}$ (C) $y = \frac{3}{2}x + \frac{1}{3}$ (D) $y = \frac{2}{3}x + \frac{17}{6}$ (E) $y = -\frac{2}{3}x + \frac{1}{3}$

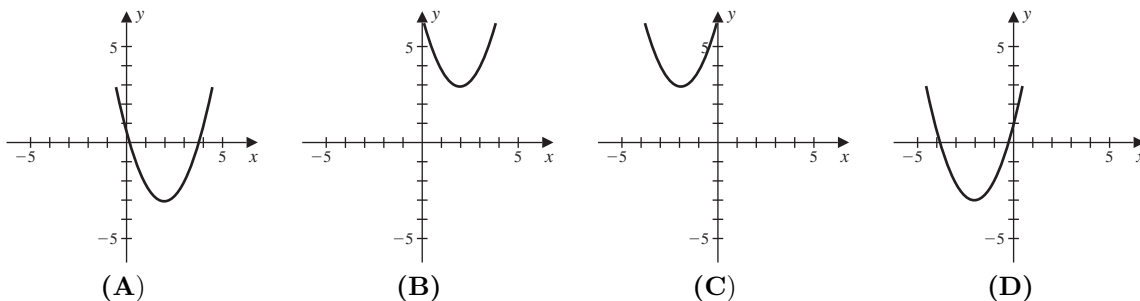
18. A new computer workstation costs \$12,000. Its useful lifetime is 6 years, at which time it will be worth an estimated \$3000. The company calculates its depreciation using the linear decline method that is an option in the tax laws. Find the linear equation that expresses the value of the equipment as a function of time t , for $0 \leq t \leq 6$.

- (A) $12,000 - 3000t$ (B) $9000 - 1500t$ (C) $12,000 - 1500t$ (D) $9000 - 3000t$
 (E) $12,000 - 1550t$

19. Sketch the graph of the quadratic equation $y = (x + 1)^2 - 1$.



20. Sketch the graph of the quadratic equation $y = x^2 + 4x + 1$.



21. Find the domain of $f(x) = \sqrt{x^2 - 12}$.

- (A) $x \in (-\infty, -2\sqrt{3}) \cup (2\sqrt{3}, \infty)$ (B) $x \in (-2\sqrt{3}, \infty)$ (C) $x \in (-\infty, -2\sqrt{3}]$ (D) $x \in (2\sqrt{3}, \infty)$
 (E) $x \in (-\infty, -2\sqrt{3}] \cup [2\sqrt{3}, \infty)$

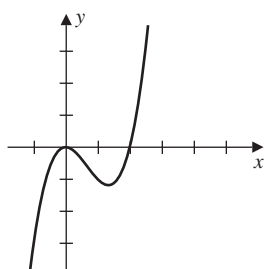
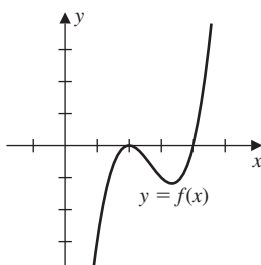
22. For a small manufacturing firm, the unit cost $C(x)$ in dollars of producing x units per day is given by

$$C(x) = x^2 - 120x + 4000.$$

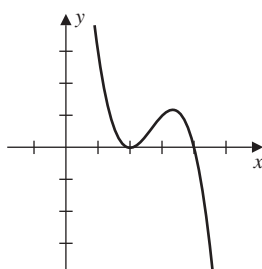
How many items should be produced per day to minimize the unit cost, and what is the minimum unit cost?

- (A) Firm should produce 90 items per day; minimum unit cost is \$300.
 (B) Firm should produce 60 items per day; minimum unit cost is \$400.
 (C) Firm should produce 50 items per day; minimum unit cost is \$500.
 (D) Firm should produce 60 items per day; minimum unit cost is \$300.
 (E) Firm should produce 90 items per day; minimum unit cost is \$400.

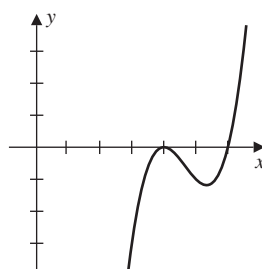
23. Use the graph of the function shown in the accompanying figure to sketch the graph of $y = f(x + 2)$.



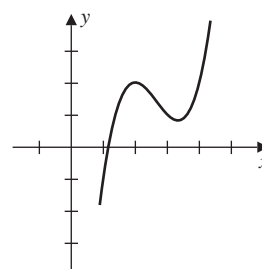
(A)



(B)



(C)



(D)

24. Find an equation of the circle whose center lies in the fourth quadrant, has radius 4, and is tangent to both the x -axis and the y -axis.

(A) $(x - 4)^2 + (y + 4)^2 = 16$ (B) $(x + 4)^2 + (y + 4)^2 = 16$ (C) $(x + 4)^2 + (y - 4)^2 = 16$
 (D) $(x - 4)^2 + (y - 4)^2 = 16$ (E) $x^2 + (y + 4)^2 = 16$

25. Determine any axis intercepts and describe and axis or origin symmetry of $y = 2 - 2x^2$.

(A) $(-1, 0), (1, 0), (2, 2)$; y -axis symmetry (B) $(-1, 0), (1, 0), (0, 2)$; y -axis symmetry
 (C) $(-1, 0), (1, 0), (0, 2)$; x -axis symmetry (D) $(0, -1), (1, 0), (0, 2)$; y -axis symmetry
 (E) $(-1, 0), (0, 1), (0, 2)$; origin symmetry

Chapter 1 Form C: Answers

- | | | | | |
|------|-------|-------|-------|-------|
| 1. C | 6. B | 11. B | 16. B | 21. E |
| 2. A | 7. B | 12. A | 17. B | 22. B |
| 3. C | 8. E | 13. D | 18. C | 23. A |
| 4. D | 9. A | 14. E | 19. C | 24. A |
| 5. E | 10. E | 15. C | 20. D | 25. B |

Chapter 1 Form D: Test

1. Use interval notation to list the values of x that satisfy the inequality $-3x + 4 < 5$.

- (A) $(-\infty, -\frac{1}{3})$ (B) $[-\frac{1}{3}, \infty)$ (C) $[-\infty, -\frac{1}{3})$ (D) $(-\frac{1}{3}, \infty)$ (E) $(-3, \infty)$

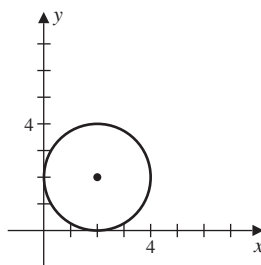
2. Find the range of $f(x) = x^2 - 2x + 2$.

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

3. Express the interval $(-\infty, -1]$ using inequalities.

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

4. Find the equation of the circle shown in the figure.



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

5. Find an equation of the circle whose center lies in the third quadrant, that has radius 5 and that is tangent to both the x -axis and the y -axis.

- (A) $(x - 5)^2 + (y - 5)^2 = 25$ (B) $(x + 5)^2 + (y + 5)^2 = 5$ (C) $(x + 5)^2 + (y + 5)^2 = 25$
 (D) $(x - 5)^2 + (y + 5)^2 = 25$ (E) $(x + 5)^2 - (y - 5)^2 = 25$

6. Use interval notation to list the values of x that satisfy $x^2 - 2x - 3 > 0$.

- (A) $[-1, 3]$ (B) $(-\infty, -1] \cup [3, \infty)$ (C) $(-1, 3)$ (D) $(-3, 1)$ (E) $(-\infty, -1) \cup (3, \infty)$

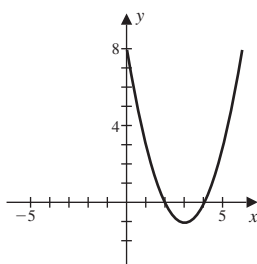
7. Find the distance d between the points -5 and 9 , and the midpoint of the line segment connecting them.

- (A) $d = 12$, midpoint : 6 (B) $d = 14$, midpoint : 2 (C) $d = 15$, midpoint : 2
 (D) $d = 12$, midpoint : 1 (E) $d = 15$, midpoint : 1

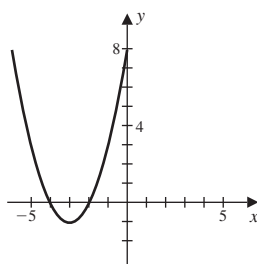
8. Express the inequality $-1 \leq x \leq 2$ using interval notation.

- (A) $(-\infty, -1) \cup (2, \infty)$ (B) $[-1, 2]$ (C) $(-1, 2)$ (D) $(-\infty, -1] \cup [2, \infty)$ (E) $[-1, 2)$

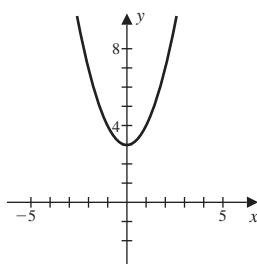
9. Which of the following is the graph of the quadratic equation $y = x^2 - 4x + 3$.



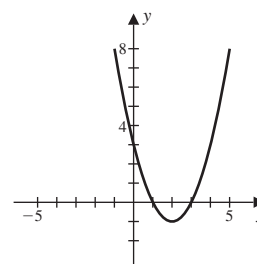
(A)



(B)



(C)



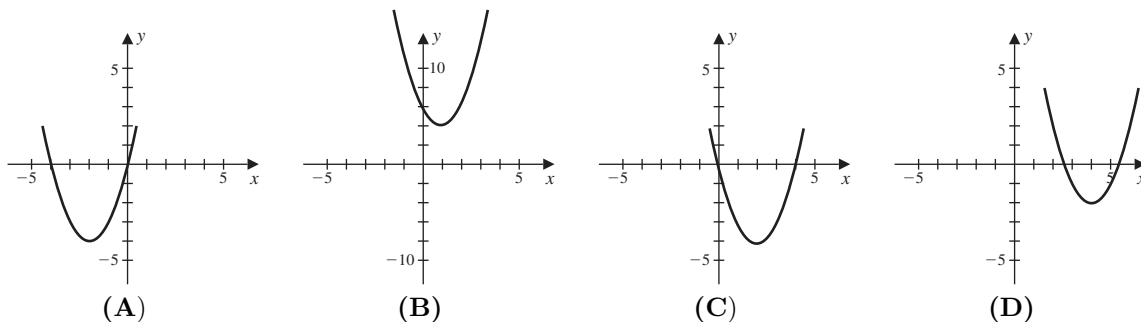
(D)

10. Find the slope intercept equation of the line that passes through $(-1, -3)$ and has slope -2 .
 (A) $y = -2x + 5$ (B) $y = -2x - 2$ (C) $y = -3x - 5$ (D) $y = -2x - 5$ (E) $y = 3x + 5$
11. Find the slope intercept equation of the line that passes through $(4, 3)$ and is parallel to $2x - 3y = 2$.
 (A) $y = \frac{2}{3}x + \frac{1}{3}$ (B) $y = -\frac{2}{3}x + \frac{1}{3}$ (C) $y = -\frac{3}{2}x + \frac{1}{3}$ (D) $y = \frac{2}{3}x - \frac{17}{3}$ (E) $y = -\frac{2}{3}x - \frac{1}{3}$
12. Find the equation of the line that pass through the point $(-6, -5)$ and has slope 4.
 (A) $y = -4x + 19$ (B) $y = 4x + 24$ (C) $y = 4x + 19$ (D) $y = 4x - 19$ (E) $y = -4x - 19$
13. Determine any axis intercepts and describe any axis or origin symmetry of the equation $y = 2 - 2x^2$.
 (A) $(-1, 0), (1, 0), (0, 2)$; symmetry: x -axis (B) $(-2, 0), (2, 0), (0, 1)$; symmetry: y -axis
 (C) $(-2, 0), (2, 0), (0, 2)$; symmetry: y -axis (D) $(0, -1), (0, 1), (2, 0)$; symmetry: x -axis
 (E) $(-1, 0), (1, 0), (0, 2)$; symmetry: y -axis
14. Complete the square on the x and y terms to find the center and radius of the circle with equation $x^2 + 4x + y^2 + 6y + 9 = 0$
 (A) the center is $(2, 3)$ and the radius is 4 (B) the center is $(-2, -3)$ and the radius is 2
 (C) the center is $(2, 3)$ and the radius is 2 (D) the center is $(-4, -6)$ and the radius is 9
 (E) the center is $(-2, -3)$ and the radius is 4
15. Find the domain of $f(x) = \sqrt{\frac{x^2}{x^2 - 1}}$.
 (A) $x \in 0 \cup (-\infty, -1) \cup (1, \infty)$ (B) $x \in (-\infty, -1) \cup (1, \infty)$ (C) $x \in 0 \cup (-\infty, -1] \cup [1, \infty)$
 (D) $x \in (-\infty, -1] \cup [1, \infty)$ (E) $x \in (1, \infty)$
16. The height of a right circular cylinder is four times the radius r , express the volume as a function of r .
 (A) $4\pi r^3$ (B) $8\pi r^3$ (C) $4\pi r^2$ (D) $2\pi r^3$ (E) $4\pi r^4$
17. Express the area of an equilateral triangle as a function of the length $5x$ of a side.
 (A) $\frac{25x^2\sqrt{3}}{4}$ (B) $\frac{15x^2\sqrt{3}}{4}$ (C) $\frac{25x^3\sqrt{3}}{4}$ (D) $\frac{25x^2\sqrt{3}}{4}$ (E) $\frac{25x^2}{4}$
18. A new computer workstation costs \$8000. Its useful lifetime is 5 years, at which time it will be worth an estimated \$2000. The company calculates its depreciation using the linear decline method that is an option in the tax laws. Find the linear equation that expresses the value of the equipment as a function of time t , for $0 \leq t \leq 5$.
 (A) $2000 - 1200t$ (B) $8000 - 2000t$ (C) $8000 - 1200t$ (D) $10,000 - 1200t$
 (E) $10,000 - 2000t$

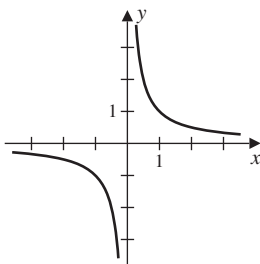
19. Find the distance between the points $(2, 4)$ and $(-1, 3)$, and the midpoint of the line segment joining the points.

(A) $d = \sqrt{2}$; midpoint : $\left(\frac{1}{2}, \frac{7}{2}\right)$ (B) $d = \sqrt{10}$; midpoint : $\left(\frac{3}{2}, \frac{1}{2}\right)$
 (C) $d = \sqrt{10}$; midpoint : $\left(\frac{1}{2}, -\frac{1}{2}\right)$ (D) $d = \sqrt{10}$; midpoint : $\left(\frac{1}{2}, \frac{7}{2}\right)$
 (E) $d = \sqrt{2}$; midpoint : $\left(\frac{3}{2}, \frac{1}{2}\right)$

20. Which of the following is the graph of the quadratic equation $y = (x + 2)^2 - 4$.



21. Use the graph of the function to determine the range of the function.



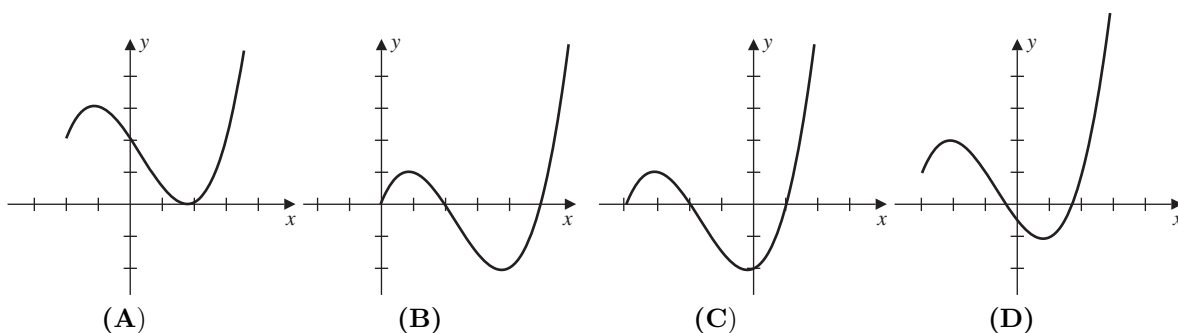
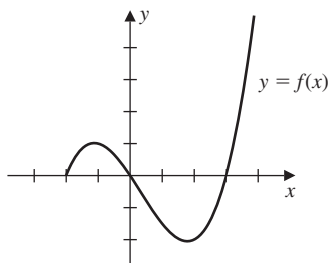
- (A) $(-\infty, \infty)$ (B) $(-\infty, 0)$ (C) $(-\infty, -1) \cup (1, \infty)$ (D) $(0, \infty)$ (E) $(-\infty, 0) \cup (0, \infty)$

22. If $f(x) = 4x^2 + 3x + 1$, find

$$\frac{f(x+h) - f(x)}{h} \text{ as } h \rightarrow 0.$$

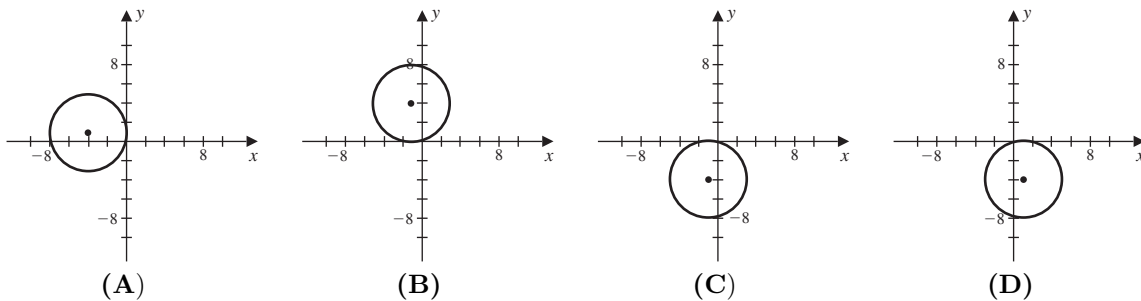
(A) $8x + 3$ (B) $4x + 7$ (C) $8x + 4$ (D) $4x + 3$ (E) $8x + 7$

23. Use the graph of the function shown in the accompanying figure to sketch the graph of $y = f(x + 2)$.



24. Find the standard form of the equation of the circle with center $(1, -4)$ and radius 4, and sketch its graph.

$(x + 4)^2 + (y - 1)^2 = 16$
 $(x + 1)^2 + (y - 4)^2 = 16$
 $(x - 1)^2 + (y - 4)^2 = 4$
 $(x - 1)^2 + (y + 4)^2 = 16$



25. For a small manufacturing firm, the unit cost $C(x)$ in dollars of producing x units per day is given by

$$C(x) = x^2 - 120x + 4000.$$

How many items should be produced per day to minimize the unit cost? What is the minimum unit cost?

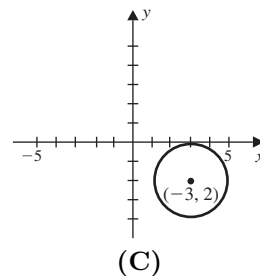
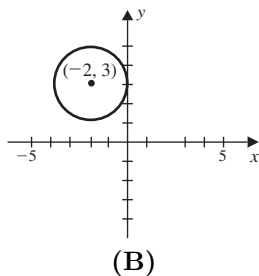
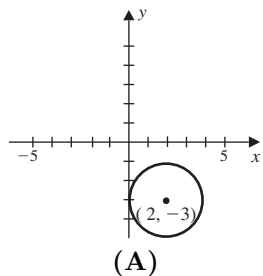
- (A) Produce 60 items per day, minimum unit cost is \$300.
- (B) Produce 70 items per day, minimum unit cost is \$400.
- (C) Produce 60 items per day, minimum unit cost is \$400.
- (D) Produce 80 items per day, minimum unit cost is \$300.
- (E) Produce 70 items per day, minimum unit cost is \$500.

Chapter 1 Form D: Answers

- | | | | | |
|------|-------|-------|-------|-------|
| 1. D | 6. E | 11. A | 16. A | 21. E |
| 2. C | 7. B | 12. C | 17. D | 22. A |
| 3. A | 8. B | 13. E | 18. C | 23. B |
| 4. C | 9. C | 14. B | 19. D | 24. C |
| 5. C | 10. D | 15. A | 20. A | 25. C |

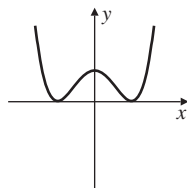
Chapter 1 Form E: Test

- Express the interval $(-\infty, 3)$ using inequalities.
 (A) $x \leq 3$ (B) $x \leq 2$ (C) $3 < x$ (D) $x < 3$ (E) $2 \leq x$
- Express the inequality $-1 \leq x \leq 2$ using interval notation.
 (A) $(-\infty, -1] \cup [2, \infty)$ (B) $[-1, 2]$ (C) $(-\infty, -1) \cup (2, \infty)$ (D) $(-1, 2)$ (E) $(-1, 2]$
- Find the distance between the points 1 and 8, and the midpoint of the line segment connecting them.
 (A) $d = 7$; midpoint : $\frac{9}{2}$ (B) $d = 8$; midpoint : 4 (C) $d = 7$; midpoint : $\frac{7}{2}$ (D) $d = 9$; midpoint : $\frac{9}{2}$
 (E) $d = 9$; midpoint : 4
- Find all values of x that solve the equation $|2x + 3| = 1$.
- Solve the inequality $|x - 6| \leq 1$ and write the solution using interval notation.
- Indicate on the xy -plane those points (x, y) for which $|x + 2| \leq 1$ and $|y - 2| < 3$.
- Consider $f(x) = -x^2 + 6x - 8$.
 - Express the quadratic in standard form.
 - Find any axis intercepts.
 - Find the maximum of the function.
 - Find the minimum of the function.
- Find the standard form of the equation of the circle with center $(-2, 3)$ and radius 2, and sketch the graph.



- Find an equation of the circle whose center lies in the third quadrant, has radius 5, and is tangent to both the x -axis and the y -axis.
 (A) $(x - 5)^2 + (y - 5)^2 = 25$ (B) $(x + 5)^2 + (y + 5)^2 = 5$ (C) $(x + 5)^2 + (y + 5)^2 = 25$
 (D) $(x - 5)^2 + (y + 5)^2 = 25$ (E) $(x + 5)^2 - (y - 5)^2 = 25$

10. Specify any axis or origin symmetry of the graph that is shown

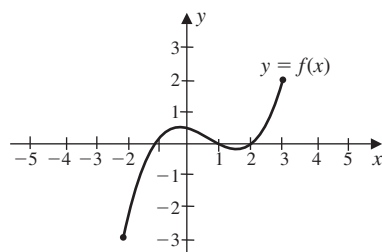


11. Find the distance between the points of intersection of the graphs $y = x^2 + 5$ and $y = 6$.

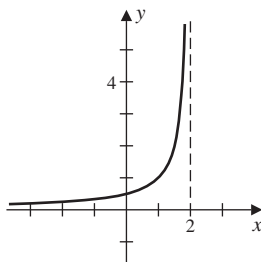
12. Find exact solutions for the following if $f(x) = 4x^2 + 1$.

- | | |
|--------------------------|---------------------|
| (a) $f(2)$ | (e) $f(2x)$ |
| (b) $f(\sqrt{3})$ | (f) $f(1-x)$ |
| (c) $f(2 + \sqrt{3})$ | (g) $f(x+h)$ |
| (d) $f(2) + f(\sqrt{3})$ | (h) $f(x+h) - f(x)$ |

13. The graph of the function f is given in the figure.



- | | |
|-----------------------------------|------------------------|
| (a) Determine $f(-2)$. | (c) Determine $f(2)$. |
| (b) Determine $f(0)$. | (d) Determine $f(3)$. |
| (e) Determine the domain of f . | |
| (f) Determine the range of f . | |
14. Use the graph to determine the range of the function.



- | | | | | |
|-------------------|-------------------------|--------------------|--------------------|-------------------|
| (A) $[0, \infty)$ | (B) $(-\infty, \infty)$ | (C) $(-\infty, 0)$ | (D) $(-\infty, 0]$ | (E) $(0, \infty)$ |
|-------------------|-------------------------|--------------------|--------------------|-------------------|
15. Find the range of $f(x) = x^2 - 2x + 2$.
- | | | | | |
|-------------------|---------------------|-------------------|--------------------|--------------------|
| (A) $(1, \infty)$ | (B) $(-\infty, -1]$ | (C) $[1, \infty)$ | (D) $[-1, \infty)$ | (E) $(-\infty, 1]$ |
|-------------------|---------------------|-------------------|--------------------|--------------------|

16. Find the domain of each function.

(a) $f(x) = 3x + 1$

(b) $f(x) = \frac{1}{3x + 1}$

(c) $f(x) = \sqrt{3x + 1}$

(d) $f(x) = \frac{1}{\sqrt{3x + 1}}$

17. For $f(x) = 2x - 4$, determine the following.

(a) $f(x + h)$

(b) $f(x + h) - f(x)$

(c) $\frac{f(x + h) - f(x)}{h}$, when $h \neq 0$

(d) what $\frac{f(x + h) - f(x)}{h}$ approaches as $h \rightarrow 0$

18. If the height of a right circular cylinder is four times the radius r , express the volume as a function of r .

(A) $4\pi r^3$ (B) $8\pi r^3$ (C) $4\pi r^2$ (D) $2\pi r^3$ (E) $4\pi r^4$

19. Find the slope-intercept form of the equation of the line that passes through $(0, 0)$ and is perpendicular to $y = 2x + 1$.

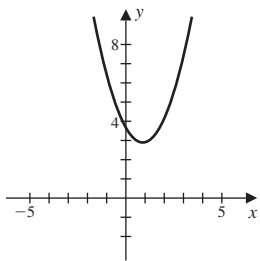
20. Find the slope-intercept equation of the line that passes through $(4, 3)$ and is parallel to $2x - 3y = 2$

(A) $y = \frac{2}{3}x + \frac{17}{3}$ (B) $y = 2x + \frac{1}{3}$ (C) $y = 2x + 3$ (D) $y = -\frac{2}{3}x + \frac{1}{3}$ (E) $y = \frac{2}{3}x + \frac{1}{3}$

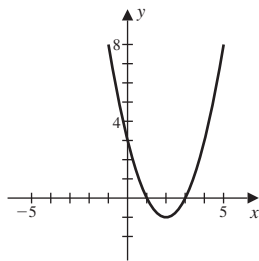
21. Find the slope intercept equation of the line that has x -intercept -2 and y -intercept -3 .

22. Determine the vertex and sketch the graph of the parabola with equation $y = (x - 1)^2 + 1$

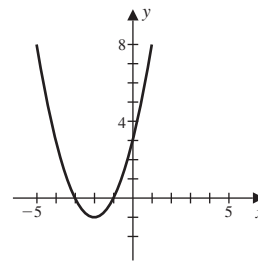
23. Sketch the graph of the quadratic equation $y = x^2 - 4x + 3$.



(A)

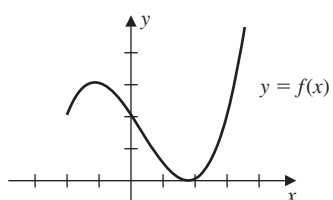
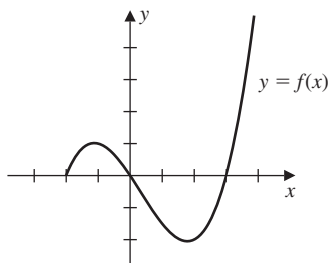


(B)

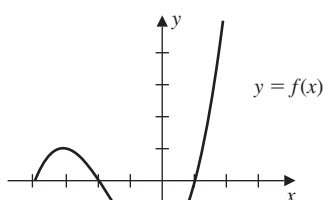


(C)

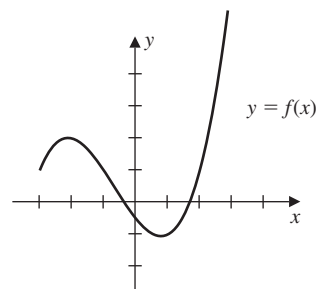
24. Use the graph of the function shown in the accompanying figure to sketch the graph of $y = f(x + 2)$.



(A)



(B)



(C)

25. For a small manufacturing firm, the unit cost $C(x)$ in dollars of producing x units per day is given by

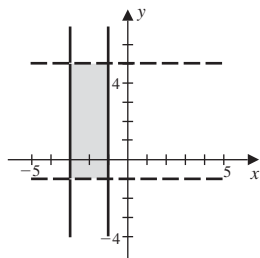
$$C(x) = x^2 - 120x + 4000.$$

How many items should be produced per day to minimize the unit cost? What is the minimum unit cost?

- (A) Produce 60 items per day, minimum unit cost is \$300.
- (B) Produce 70 items per day, minimum unit cost is \$400.
- (C) Produce 60 items per day, minimum unit cost is \$400.
- (D) Produce 80 items per day, minimum unit cost is \$300.
- (E) Produce 70 items per day, minimum unit cost is \$500.

Chapter 1 Form E: Answers

1. D
2. B
3. A
4. $x = -1$ or $x = -2$
5. $[5, 7]$
- 6.



7. (a) $f(x) = -(x - 3)^2 + 1$
 (b) axis intercepts: $(4, 0), (2, 0), (0, -8)$
 (c) maximum: $(3, 1)$
 (d) minimum: none
8. B
9. C
10. y -axis symmetry
11. $d = 2$
12. (a) $f(2) = 17$
 (b) $f(\sqrt{3}) = 13$
 (c) $f(2 + \sqrt{3}) = 29 + 16\sqrt{3}$
 (d) $f(2) + f(\sqrt{3}) = 30$
 (e) $f(2x) = 16x^2 + 1$
 (f) $f(1 - x) = 5 - 8x + 4x^2$
 (g) $f(x + h) = 4x^2 + 8xh + 4h^2 + 1$
 (h) $f(x + h) - f(x) = 8xh + 4h^2$
13. (a) $f(-2) = -3$
 (b) $f(0) = \frac{1}{2}$
 (c) $f(2) = 0$
 (d) $f(3) = 2$
 (e) domain: $[-2, 3]$
 (f) range: $[-3, 2]$
14. E
15. C
16. (a) $(-\infty, \infty)$

(b) $\left(-\infty, -\frac{1}{3}\right) \cup \left(-\frac{1}{3}, \infty\right)$

(c) $\left[-\frac{1}{3}, \infty\right)$

(d) $\left(-\frac{1}{3}, \infty\right)$

17. (a) $2x + 2h - 4$

(b) $2h$

(c) 2

(d) 2

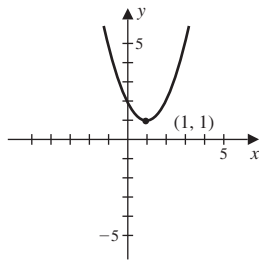
18. A

19. $y = -\frac{1}{2}x$

20. E

21. $y = -\frac{3}{2}x - 3$

22. The vertex is $(1, 1)$.



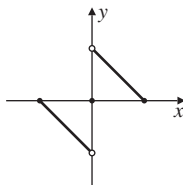
23. A

24. B

25. C

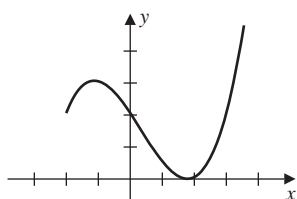
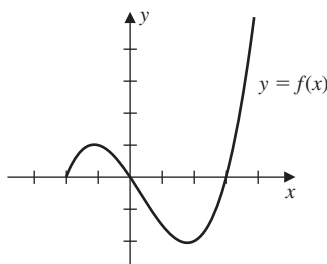
Chapter 1 Form F: Test

- The height of a right circular cylinder is four times the radius r , express the volume as a function of r .
(A) $4\pi r^3$ (B) $8\pi r^3$ (C) $4\pi r^2$ (D) $2\pi r^3$ (E) $4\pi r^4$
- Find an equation of the circle whose center lies in the third quadrant, that has radius 5 and that is tangent to both the x -axis and the y -axis.
(A) $(x - 5)^2 + (y - 5)^2 = 25$ (B) $(x + 5)^2 + (y + 5)^2 = 5$ (C) $(x + 5)^2 + (y + 5)^2 = 25$
(D) $(x - 5)^2 + (y + 5)^2 = 25$ (E) $(x + 5)^2 - (y - 5)^2 = 25$
- Find the distance between the points 1 and 8, and the midpoint of the line segment connecting them.
(A) $d = 7$; midpoint : $\frac{9}{2}$ (B) $d = 8$; midpoint : 4 (C) $d = 7$; midpoint : $\frac{7}{2}$
(D) $d = 9$; midpoint : $\frac{9}{2}$ (E) $d = 9$; midpoint : 4
- Solve the inequality $|x - 6| \leq 1$ and write the solution using interval notation.
- Specify any axis or origin symmetry of the graph.

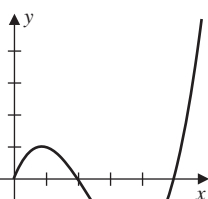


- Determine the vertex of the parabola with equation $y = (x - 1)^2 + 1$ and sketch its graph.
- Find the range of $f(x) = x^2 - 2x + 2$.
(A) $(1, \infty)$ (B) $(-\infty, -1]$ (C) $[-1, \infty)$ (D) $(-\infty, 1]$ (E) $[1, \infty)$
- Find the slope-intercept equation of the line that has x -intercept -2 and y -intercept -3 .
- Express the inequality $-1 \leq x \leq 2$ using interval notation.
(A) $(-\infty, -1] \cup [2, \infty)$ (B) $[-1, 2]$ (C) $(-\infty, -1) \cup (2, \infty)$ (D) $(-1, 2)$ (E) $(-1, 2]$
- Find the slope-intercept form of the equation of the line that passes through $(0, 0)$ and is perpendicular to $y = 2x + 1$.

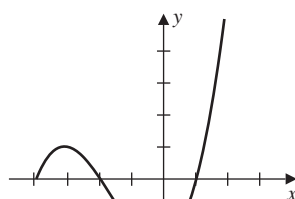
11. Use the graph of the function shown in the accompanying figure to sketch the graph of $y = f(x + 2)$.



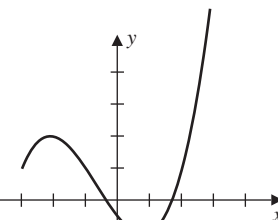
(A)



(B)



(C)



(D)

12. Find the domain of each function.

(a) $f(x) = 3x + 1$

(c) $f(x) = \sqrt{3x + 1}$

(b) $f(x) = \frac{1}{3x + 1}$

(d) $f(x) = \frac{1}{\sqrt{3x + 1}}$

13. Consider the quadratic function $f(x) = -x^2 - 4x - 4$

(a) Express this in standard form.

(c) Find the maximum of the function.

(b) Find any axis intercepts.

(d) Find the minimum of the function.

14. Find the slope intercept equation of the line that passes through $(-1, -3)$ with slope -2 .

(A) $y = -2x + 5$

(B) $y = -2x - 2$

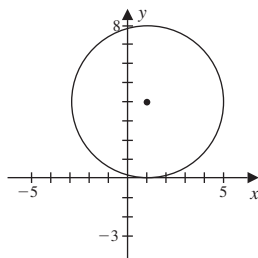
(C) $y = -3x - 5$

(D) $y = -2x - 5$

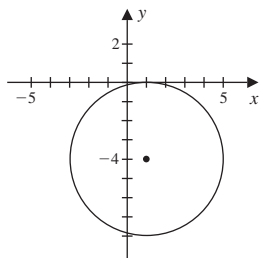
(E) $y = 3x + 5$

15. Find the standard form of the equation of the circle with center $(1, -4)$ and radius 4, and sketch the graph.

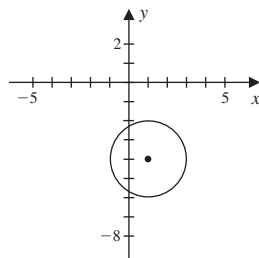
$(x - 1)^2 + (y - 4)^2 = 16$ $(x - 1)^2 + (y + 4)^2 = 16$ $(x - 1)^2 + (y + 4)^2 = 4$ $(x - 1)^2 + (y - 4)^2 = 4$



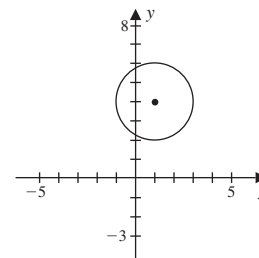
(A)



(B)



(C)



(D)

21. Consider $f(x) = 2x - 4$
- (a) Find $f(x + h)$.
 - (b) Find $f(x + h) - f(x)$.
 - (c) Find $\frac{f(x + h) - f(x)}{h}$, where $h \neq 0$.
 - (d) Find what $\frac{f(x + h) - f(x)}{h}$ approaches as $h \rightarrow 0$.
22. Find all values of x that solve the equation $|2x + 3| = 1$.
23. If $f(x) = 4x^2 + 1$, find exact solutions for the following values.
- (a) $f(2)$
 - (b) $f(\sqrt{3})$
 - (c) $f(2 + \sqrt{3})$
 - (d) $f(2) + f(\sqrt{3})$
 - (e) $f(2x)$
 - (f) $f(1 - x)$
 - (g) $f(x + h)$
 - (h) $f(x + h) - f(x)$
24. Find the distance between the points of intersection of the graphs $y = x^2 + 5$ and $y = 6$.
25. For a small manufacturing firm, the unit cost $C(x)$ in dollars of producing x units per day is given by

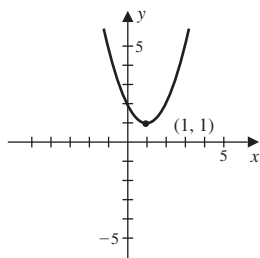
$$C(x) = x^2 - 120x + 4000.$$

How many items should be produced per day to minimize the unit cost, and what is the minimum unit cost?

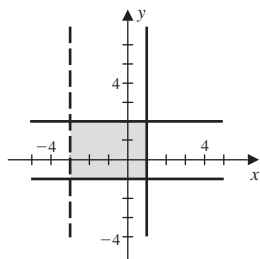
- (A) Produce 60 items per day, minimum unit cost is \$300.
- (B) Produce 70 items per day, minimum unit cost is \$400.
- (C) Produce 60 items per day, minimum unit cost is \$400.
- (D) Produce 80 items per day, minimum unit cost is \$300.
- (E) Produce 70 items per day, minimum unit cost is \$500.

Chapter 1 Form F: Answers

1. A
2. C
3. A
4. $[5, 7]$
5. origin symmetry
6. The vertex is $(1, 1)$



7. E
8. $y = -\frac{3}{2}x - 3$
9. B
10. $y = -\frac{1}{2}x$
11. C
12. (a) $(-\infty, \infty)$
 (b) $(-\infty, -\frac{1}{3}) \cup (-\frac{1}{3}, \infty)$
 (c) $[-\frac{1}{3}, \infty)$
 (d) $(-\frac{1}{3}, \infty)$
13. (a) $f(x) = -(x + 2)^2$
 (b) intercepts: $(-2, 0)$ and $(0, -4)$
 (c) maximum: $(-2, 0)$
 (d) minimum: none
14. D
15. B
16. C
- 17.



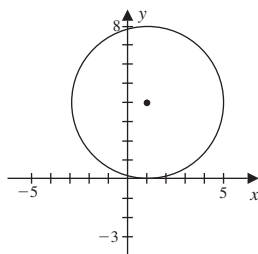
18. D
19. (a) $f(-2) = -3$
(b) $f(0) = \frac{1}{2}$
(c) $f(2) = 0$
(d) $f(3) = 2$
(e) domain: $[-2, 3]$
(f) range: $[-3, 2]$
20. D
21. (a) $2x + 2h - 4$
(b) $2h$
(c) 2
(d) 2
22. $x = -1$ or $x = -2$
23. (a) $f(2) = 17$
(b) $f(\sqrt{3}) = 13$
(c) $f(2 + \sqrt{3}) = 29 + 16\sqrt{3}$
(d) $f(2) + f(\sqrt{3}) = 30$
(e) $f(2x) = 16x^2 + 1$
(f) $f(1 - x) = 5 - 8x + 4x^2$
(g) $f(x + h) = 4x^2 + 8xh + 4h^2 + 1$
(h) $f(x + h) - f(x) = 8xh + 4h^2$
24. $d = 2$
25. C

Chapter 1 Form G: Test

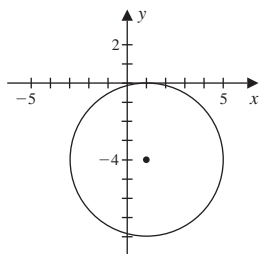
- Express the interval $[-2, 4]$ using inequalities.
 (A) $-2 < x < 4$ (B) $-4 < x < 2$ (C) $-4 \leq x \leq 2$ (D) $-2 \leq x \leq 4$ (E) $-2 \geq x \geq 4$
- Express the inequality $2 < x \leq 6$ using interval notation.
 (A) $(2, 6)$ (B) $(2, 6]$ (C) $[2, 6]$ (D) $(-\infty, 2) \cup [6, \infty)$ (E) $[2, 6)$
- Find the distance between the points 3 and 7, and find the midpoint of the line segment joining them.
 (A) $d = -4$, midpoint:5 (B) $d = 4$, midpoint:5 (C) $d = 10$, midpoint:2
 (D) $d = 4$, midpoint:2 (E) $d = 10$, midpoint:5

- Find the standard form of the equation of the circle with center $(1, -4)$ and radius 4, and sketch the graph.

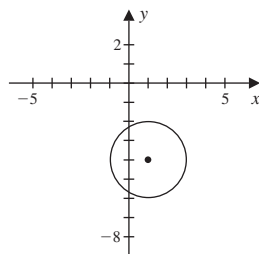
$$(x - 1)^2 + (y - 4)^2 = 16 \quad (x - 1)^2 + (y + 4)^2 = 16 \quad (x - 1)^2 + (y + 4)^2 = 4 \quad (x - 1)^2 + (y - 4)^2 = 4$$



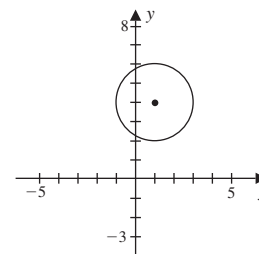
(A)



(B)

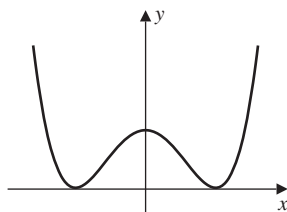


(C)



(D)

- Find an equation of the circle whose center lies in the third quadrant, that has radius 2, and that is tangent to both the x -axis and the y -axis.
 (A) $x^2 + y^2 = 4$ (B) $(x - 2)^2 + (y - 2)^2 = 4$ (C) $(x + 2)^2 + (y + 2)^2 = 4$
 (D) $(x + 2)^2 + (y - 2)^2 = 4$ (E) $(x - 2)^2 + (y + 2)^2 = 4$
- Specify any axis or origin symmetry.



- Determine any axis intercepts, and describe any axis or origin symmetry of $y = x^2 - 1$.
- Find the distance between the points of intersection of the graphs $y = x^2 - 3$ and $y = x + 3$.
 (A) $d = 5\sqrt{2}$ (B) $d = 25$ (C) $d = 25\sqrt{2}$ (D) $d = 50$ (E) $d = 10$
- Use interval notation to list the values of x that satisfy the inequality $-3x + 4 < 5$.
 (A) $(\frac{1}{3}, \infty)$ (B) $(-1, \infty)$ (C) $[-1, \infty)$ (D) $[-\frac{1}{3}, \infty)$ (E) $(-\frac{1}{3}, \infty)$

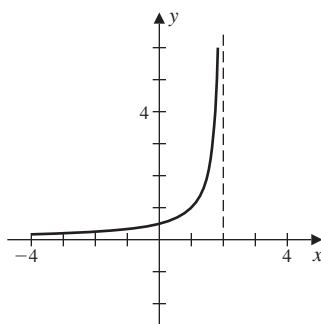
10. Suppose $f(x) = \sqrt{x+2}$. Find the following values.

- (a) $f(-1)$ (c) $f(4)$ (e) $f(a)$ (g) $f(x+h)$
 (b) $f(0)$ (d) $f(7)$ (f) $f(2a-1)$ (h) $f(x+h) - f(x)$

11. Find the slope-intercept equation of the line that passes through $(-1, 2)$ and is parallel to $3x + 2y = 3$.

- (A) $y = -\frac{3}{2}x + 3$ (B) $y = -\frac{2}{3}x + \frac{7}{2}$ (C) $y = -\frac{3}{2}x - \frac{1}{2}$ (D) $y = -\frac{3}{2}x + \frac{1}{2}$
 (E) $y = \frac{3}{2}x + \frac{7}{2}$

12. Determine the domain of the function.



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

13. Find the range of $f(x) = \sqrt{x} + 3$.

- (A) $(3, \infty)$ (B) $[3, \infty)$ (C) $(-\infty, 3)$ (D) $(-\infty, 3]$ (E) $[0, \infty)$

14. Find the domain of each function in interval notation.

- (a) $f(x) = \frac{x}{x^2 - 1}$ (b) $f(x) = \frac{x+1}{x^2 - 1}$ (c) $f(x) = \sqrt{\frac{x^2}{x^2 - 1}}$

15. Suppose $f(x) = 2 - x - x^2$. Find $\frac{f(x+h) - f(x)}{h}$ where $h \neq 0$.

- (A) $2 - x - h - x^2 - 2hx - h^2$ (B) $-h - 2hx - h^2$ (C) $-1 - 2x - h$
 (D) $-1 - 2x$ (E) $1 - 2x - h$

16. Express the area of a circle as a function of its circumference.

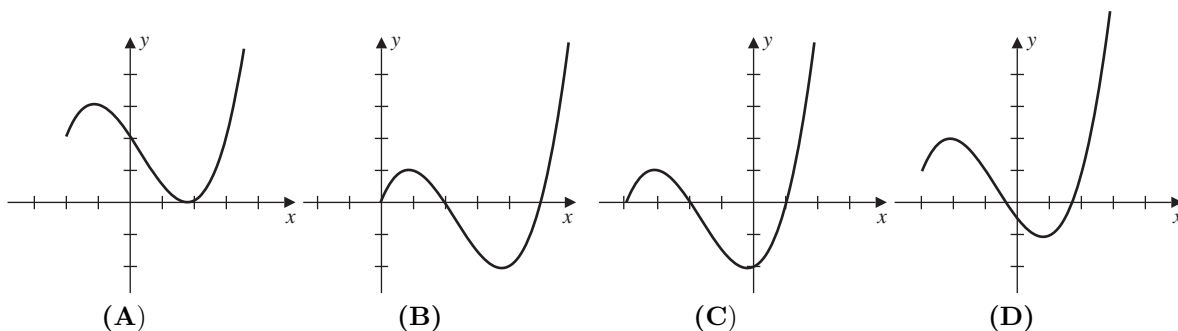
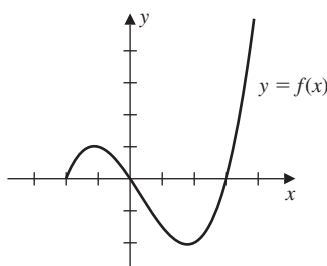
- (A) $A(C) = \frac{C^2}{4}$ (B) $A(C) = C \cdot \frac{r}{2}$ (C) $A(C) = \frac{C^2}{4\pi}$
 (D) $A(C) = \frac{C^2}{4\pi^2}$ (E) $A(C) = \frac{C}{4\pi}$

17. A rectangle has an area of 64 m^2 . Express the perimeter of the rectangle as a function of the length s of one of the sides.

18. Find equation of the line that passes through the point $(-1, -2)$ and has slope 3.

- (A) $y = 3x - 1$ (B) $y = 3x + 1$ (C) $y = 3x$ (D) $y = 3x - 2$ (E) $y = -3x + 1$

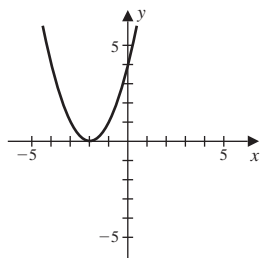
19. Find the slope-intercept equation of the line that passes through $(-3, 5)$ and is perpendicular to the line $x - 2y = 4$.
20. Find the slope-intercept equation of the line that has slope -1 and y -intercept 2 .
 (A) $y = x + 2$ (B) $y = -x + 2$ (C) $y = 2x - 1$ (D) $y = -x - 2$ (E) $y = -x$
21. Find the slope-intercept equation of the line that has x -intercept 2 and y -intercept 4 .
22. Sketch the graph of the quadratic equation $y = (x + 2)^2$.
23. Sketch the graph of the quadratic equation $y = 3x^2 + 6x$.
24. Use the graph of the function shown in the accompanying figure to sketch the graph of $y = f(x + 2)$.



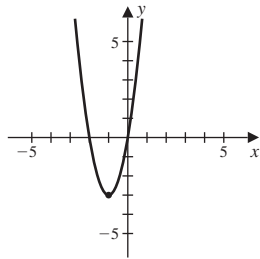
25. The function defined by $s(t) = 576 + 144t - 16t^2$ describes the height, in feet, of a rock t seconds after it has been thrown upward at 144 feet per second from the top of a 50 -story building. How long does it take the rock to hit the ground?
 (A) 9 seconds (B) 4 seconds (C) 3 seconds (D) 16 seconds (E) 12 seconds

Chapter 1 Form G: Answers

1. D
2. B
3. B
4. B
5. C
6. y -axis symmetry
7. $(-1, 0), (0, -1), (1, 0)$, y -axis symmetry
8. A
9. E
10. (a) 1 (b) $\sqrt{2}$ (c) $\sqrt{6}$ (d) 3
 (e) $\sqrt{a+2}$ (f) $\sqrt{2a+1}$ (g) $\sqrt{x+h+2}$ (h) $\sqrt{x+h+2} - \sqrt{x+2}$
11. D
12. C
13. B
14. (a) $(-\infty, -1) \cup (-1, 1) \cup (1, \infty)$
 (b) $(-\infty, -1) \cup (-1, 1) \cup (1, \infty)$
 (c) $(-\infty, -1) \cup \{0\} \cup (1, \infty)$
15. C
16. C
17. $P = 2s + \frac{128}{s}$
18. B
19. $y = -2x - 1$
20. B
21. $y = -2x + 4$
- 22.



23.

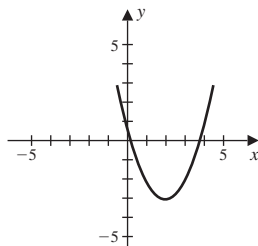


24. C

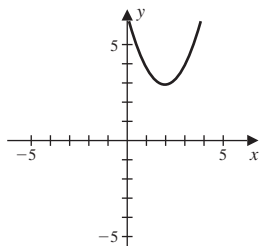
25. E

Chapter 1 Form H: Test

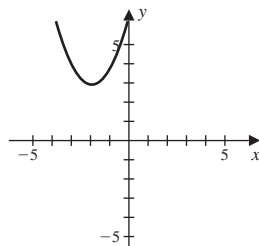
1. Sketch the graph of the quadratic equation $y = x^2 + 4x + 1$.



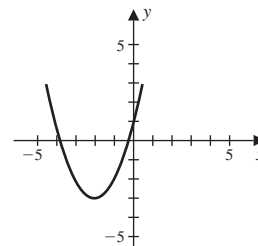
(A)



(B)



(C)



(D)

2. Find the domain of each function.

(a) $f(x) = 3x + 1$

(b) $f(x) = \frac{1}{3x + 1}$

(c) $f(x) = \sqrt{3x + 1}$

(d) $f(x) = \frac{1}{\sqrt{3x + 1}}$

3. If $f(x) = \frac{3}{2}x + \frac{1}{4}$, find $\frac{f(x+h) - f(x)}{h}$, where $h \neq 0$

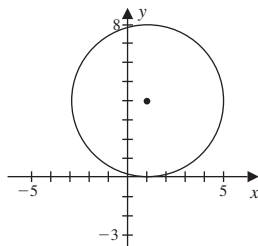
(A) $\frac{2}{3}$ (B) 0 (C) 3 (D) $\frac{1}{4}$ (E) $\frac{3}{2}$

4. Find the range of $f(x) = x^2 - 2x + 2$.

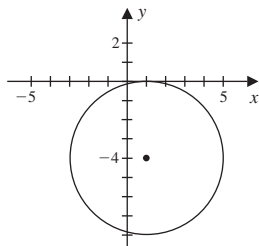
(A) $(1, \infty)$ (B) $(-\infty, -1]$ (C) $[1, \infty)$ (D) $[-1, \infty)$ (E) $(-\infty, 1]$

5. Find the standard form of the equation of the circle with center $(1, -4)$ and radius 4, and sketch the graph.

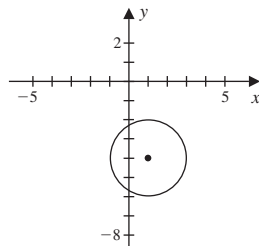
$$(x - 1)^2 + (y - 4)^2 = 16 \quad (x - 1)^2 + (y + 4)^2 = 16 \quad (x - 1)^2 + (y + 4)^2 = 4 \quad (x - 1)^2 + (y - 4)^2 = 4$$



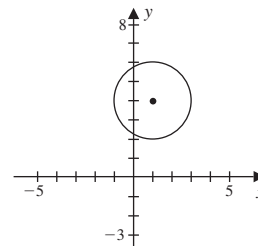
(A)



(B)



(C)



(D)

6. Find the slope intercept equation of the line that passes through $(-1, -3)$ with slope -2 .

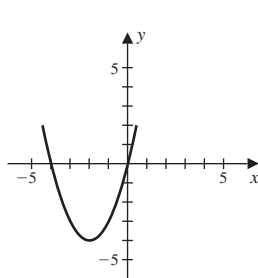
(A) $y = -2x + 5$ (B) $y = -2x - 2$ (C) $y = -3x - 5$ (D) $y = -2x - 5$ (E) $y = 3x + 5$

7. The height of a right circular cylinder is four times the radius r , express the volume as a function of r .

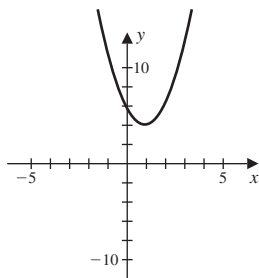
(A) $V = 4\pi r^3$ (B) $V = 8\pi r^3$ (C) $V = 4\pi r^2$ (D) $V = 2\pi r^3$ (E) $V = 4\pi r^4$

8. Determine any axis intercepts and describe any axis or origin symmetry of $y = 2 - 2x^2$.

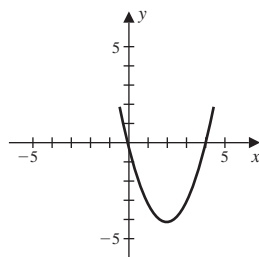
9. Which of the following is the graph of the quadratic equation $y = (x + 2)^2 - 4$.



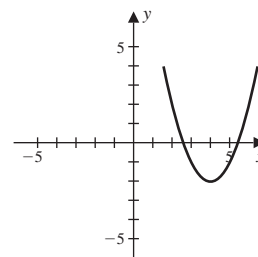
(A)



(B)

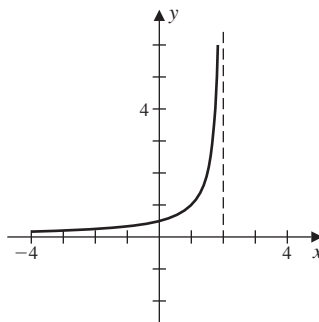


(C)



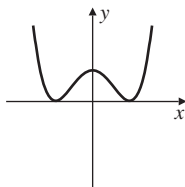
(D)

10. Find the slope intercept equation of the line that has x -intercept -2 and y -intercept -3 .
11. Find the distance between the points of intersection of the graphs $y = x^2 + 2$ and $y = 3$
 (A) $d = 2$ (B) $d = 1$ (C) $d = 3$ (D) $d = 5$ (E) $d = 6$
12. Find the slope-intercept equation of the line that passes through $(4, 3)$ and is parallel to $2x - 3y = 2$.
 (A) $y = \frac{2}{3}x + \frac{17}{3}$ (B) $y = 2x + \frac{1}{3}$ (C) $y = 2x + 3$ (D) $y = -\frac{2}{3}x + \frac{1}{3}$ (E) $y = \frac{2}{3}x + \frac{1}{3}$
13. If $f(x) = 4x^2 + 1$, find exact solutions for the following values.
 (a) $f(2)$
 (b) $f(\sqrt{3})$
 (c) $f(2 + \sqrt{3})$
 (d) $f(2) + f(\sqrt{3})$
 (e) $f(2x)$
 (f) $f(1 - x)$
 (g) $f(x + h)$
 (h) $f(x + h) - f(x)$
14. Find the slope-intercept form of the equation of the line that passes through $(0, 0)$ and is perpendicular to $y = 2x + 1$.
15. Determine the domain of the function.



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

16. A rectangle has an area of 64 m^2 . Express the perimeter of the rectangle as a function of the length s of one of the sides.
17. Find the slope intercept equation of the line that passes through $(-1, -3)$ with slope -2 .
 (A) $y = -2x + 5$ (B) $y = -2x - 2$ (C) $y = -3x - 5$ (D) $y = -2x - 5$ (E) $y = 3x + 5$
18. Specify any axis or origin symmetry.



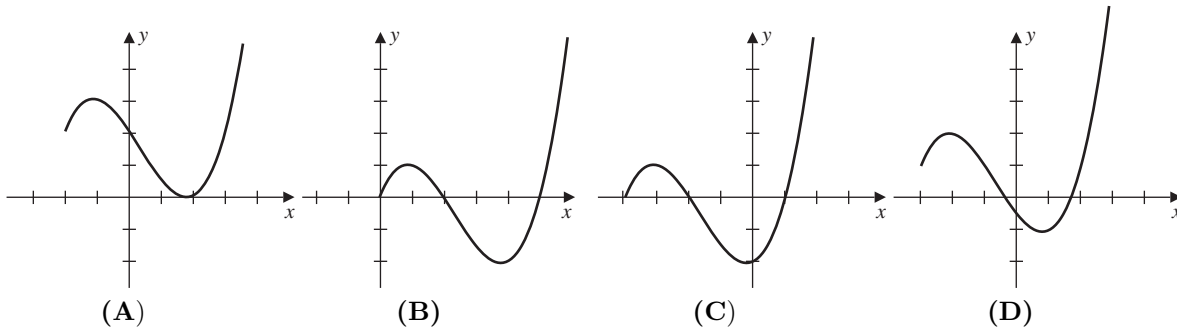
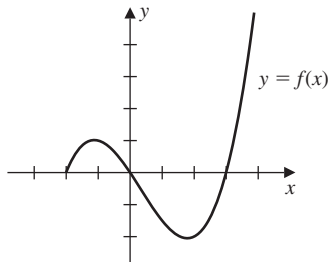
19. Express the interval $(-\infty, 3)$ using inequalities.
 (A) $x \leq 3$ (B) $x < 3$ (C) $x \leq 2$ (D) $3 < x$ (E) $2 \leq x$
20. For a small manufacturing firm, the unit cost $C(x)$ in dollars of producing x units per day is given by

$$C(x) = x^2 - 120x + 4000.$$

How many items should be produced per day to minimize the unit cost and what is the minimum unit cost?

- (A) Manufacturing firm should produce 60 items per day, minimum unit cost is \$300.
 (B) Manufacturing firm should produce 70 items per day, minimum unit cost is \$400.
 (C) Manufacturing firm should produce 60 items per day, minimum unit cost is \$400.
 (D) Manufacturing firm should produce 80 items per day, minimum unit cost is \$300.
 (E) Manufacturing firm should produce 70 items per day, minimum unit cost is \$500.
21. Express the inequality $-1 \leq x \leq 2$ using interval notation.
 (A) $(-\infty, -1] \cup [2, \infty)$ (B) $[-1, 2]$ (C) $(-\infty, -1) \cup (2, \infty)$ (D) $(-1, 2)$ (E) $(-1, 2]$
22. Find an equation of the circle whose center lies in the fourth quadrant, that has radius 4, and that is tangent to both the x -axis and the y -axis.
 (A) $(x - 4)^2 + (y + 4)^2 = 16$ (B) $(x + 4)^2 + (y + 4)^2 = 16$ (C) $(x + 4)^2 + (y - 4)^2 = 16$
 (D) $(x - 4)^2 + (y - 4)^2 = 16$ (E) $x^2 + (y + 4)^2 = 16$
23. Use interval notation to list the values of x that satisfy the inequality $2x - 2 \geq 8$.
 (A) $(-\infty, 5]$ (B) $[3, \infty)$ (C) $(-\infty, 3]$ (D) $(5, \infty)$ (E) $[5, \infty)$
24. Find the distance between the points $(-1, 5)$, $(7, 9)$ and the midpoint of the line segment joining the points.
 (A) $d = 4\sqrt{5}$, midpoint: $(6, 14)$ (B) $d = 16\sqrt{5}$, midpoint: $(3, 7)$ (C) $d = 4\sqrt{5}$, midpoint: $(3, 7)$
 (D) $d = 4\sqrt{5}$, midpoint: $(2, 8)$ (E) $d = 16\sqrt{5}$, midpoint: $(2, 8)$

25. Use the graph of the function shown in the accompanying figure to sketch the graph of $y = f(x + 2)$.

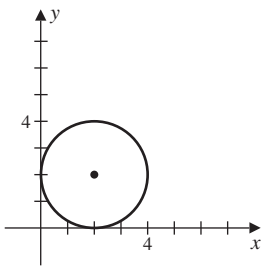


Chapter 1 Form H: Answers

1. D
2. (a) $(-\infty, \infty)$
(b) $\left(-\infty, -\frac{1}{3}\right) \cup \left(-\frac{1}{3}, \infty\right)$
(c) $\left[-\frac{1}{3}, \infty\right)$
(d) $\left(-\frac{1}{3}, \infty\right)$
3. E
4. C
5. B
6. D
7. A
8. intercepts: $(1, 0), (-1, 0), (0, 2)$; symmetry: y -axis
9. A
10. $y = -\frac{3}{2}x - 3$
11. A
12. E
13. (a) $f(2) = 17$
(b) $f(\sqrt{3}) = 13$
(c) $f(2 + \sqrt{3}) = 29 + 16\sqrt{3}$
(d) $f(2) + f(\sqrt{3}) = 30$
(e) $f(2x) = 16x^2 + 1$
(f) $f(1 - x) = 5 - 8x + 4x^2$
(g) $f(x + h) = 4x^2 + 8xh + 4h^2 + 1$
(h) $f(x + h) - f(x) = 8xh + 4h^2$
14. $y = -\frac{1}{2}x$
15. C
16. $P = 2s + \frac{128}{s}$
17. D
18. y -axis symmetry
19. B
20. C
21. B
22. A
23. E
24. C
25. C

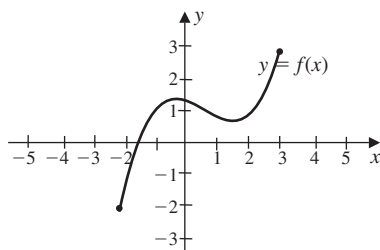
Chapter 1 Form I: Test

- Use interval notation to list the values of x that satisfy the inequality $x^2 + 2x - 3 \leq 0$.
- Use interval notation to list the values of x that satisfy the inequality $(x + 1)(x - 1)(x + 2) \geq 0$.
- Find the distance between the points 2 and 8, and the midpoint of the line segment connecting them.
 (A) $d = 6$, midpoint: 2 (B) $d = 10$, midpoint: 2 (C) $d = 6$, midpoint: 5
 (D) $d = 10$, midpoint: 2 (E) $d = 5$, midpoint: 5
- Find the equation of the circle shown in the figure.



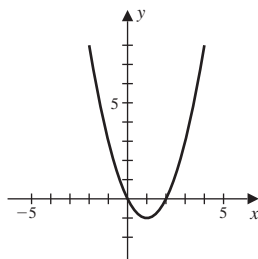
- (A) $(x + 2)^2 + (y + 2)^2 = 2$ (B) $(x - 2)^2 + (y - 2)^2 = 4$ (C) $(x + 2)^2 + (y + 2)^2 = 4$
 (D) $(x - 2)^2 + (y + 2)^2 = 4$ (E) $(x - 2)^2 + (y - 2)^2 = 2$
- Solve the inequality $|x - 3| \leq 2$ and write the solution using interval notation.
 - Determine the vertex of the parabola with equation $y = (x + 1)^2 + 1$ and sketch its graph.
 - Determine any axis intercepts, and describe any axis or origin symmetry of $y = 4 - x^2$.
 - Determine any axis intercepts and describe any axis or origin symmetry of $y = 2x^2 - 2$.
 - Consider the equation $y = x^3 + 8$.
 - Determine any axis intercepts of the equation.
 - Describe any axis or origin symmetry of the equation.
 - Find the domain of each function.
 - $f(x) = \frac{x}{4 - x^2}$
 - $f(x) = \frac{4 - x^2}{x - 2}$
 - $f(x) = \sqrt{\frac{x^2}{4 - x^2}}$

11. Find the range of $f(x) = x^2 + 2x + 1$.
 (A) $[-1, \infty)$ (B) $[0, \infty)$ (C) $(-\infty, 0]$ (D) $(-1, \infty)$ (E) $(0, \infty)$
12. Find the equation of the line that pass through the point $(-6, 5)$ and has slope -4 .
 (A) $y = -4x + 19$ (B) $y = 4x + 24$ (C) $y = 4x + 19$ (D) $y = 4x - 19$ (E) $y = -4x - 19$
13. The graph of the function f is given in the figure.

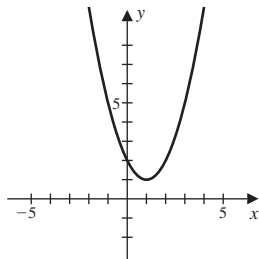


- (a) Determine $f(-2)$. (d) Determine $f(3)$.
 (b) Determine $f(0)$. (e) Determine the domain of f .
 (c) Determine $f(2)$. (f) Determine the range of f .
14. Find the slope intercept equation of the line that passes through $(-1, 7)$ with slope -2 .
 (A) $y = -2x + 5$ (B) $y = -2x - 2$ (C) $y = -3x - 5$ (D) $y = -2x - 5$
 (E) $y = 3x + 5$
15. Suppose $f(x) = 2 + x - x^2$. Find $\frac{f(x+h) - f(x)}{h}$ where $h \neq 0$.
 (A) $2 - x - h - x^2 - 2hx - h^2$ (B) $-h - 2hx - h^2$ (C) $-1 - 2x - h$
 (D) $-1 - 2x$ (E) $1 - 2x - h$
16. A rectangle has an area of 36 m^2 . Express the perimeter of the rectangle as a function of the length s of one of the sides.
17. Find the equation of the line that passes through the point $(2, 3)$ and has slope -2 .
18. Consider $f(x) = 5x - 3$.
 (a) Find $f(x+h)$.
 (b) Find $f(x+h) - f(x)$.
 (c) Find $\frac{f(x+h) - f(x)}{h}$ where $h \neq 0$.
 (d) Find what $\frac{f(x+h) - f(x)}{h}$ approaches as $h \rightarrow 0$.

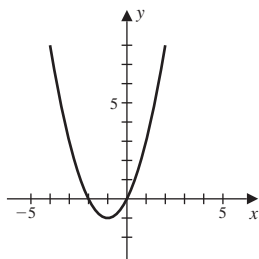
19. Sketch the graph of the quadratic equation $y = (x - 1)^2 - 1$.



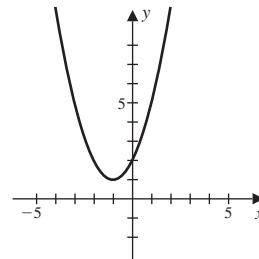
(A)



(B)



(C)



(D)

20. If the height of a right circular cylinder is four times the radius r , express the volume as a function of r .

(A) $4\pi r^3$ (B) $8\pi r^3$ (C) $4\pi r^2$ (D) $2\pi r^3$ (E) $4\pi r^4$

21. Find the slope intercept equation of the line that has x -intercept -3 and y -intercept -2 .

22. Find all values of x that solve the equation $|3x + 2| = 1$.

23. Determine the values of x when the graph of $y = 3x^2 - 6x$ lies below the x -axis.

24. Find the distance between the points $(-2, 4)$, $(6, 8)$ and the midpoint of the line segment joining the points.

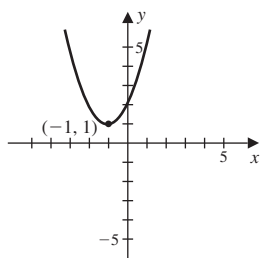
(A) $d = 4\sqrt{5}$, midpoint: $(5, 13)$ (B) $d = 16\sqrt{5}$, midpoint: $(2, 6)$ (C) $d = 4\sqrt{5}$, midpoint: $(2, 6)$
 (D) $d = 4\sqrt{5}$, midpoint: $(1, 7)$ (E) $d = 16\sqrt{5}$, midpoint: $(1, 7)$

25. Consider the parabola with equation $y = (x - 3)^2$.

- (a) Determine the vertex of the parabola.
 (b) Sketch the graph of the parabola.

Chapter 1 Form I: Answers

1. $[-3, 1]$
2. $[-2, 1] \cup [1, \infty)$
3. C
4. B
5. $[1, 5]$
6. The vertex is $(-1, 1)$



7. $(-2, 0), (0, 4), (2, 0)$, y -axis symmetry
8. intercepts: $(1, 0), (-1, 0), (0, -2)$; y -axis symmetry
9. (a) $(-2, 0)$ and $(0, 8)$
(b) none
10. (a) $(-\infty, -2) \cup (-2, 2) \cup (2, \infty)$
(b) $(-\infty, 2) \cup (2, \infty)$
(c) $(-2, 2)$
11. B
12. E
13. (a) $f(-2) = -2$
(b) $f(0) = \frac{3}{2}$
(c) $f(2) = 1$
(d) $f(3) = 3$
(e) domain: $[-2, 3]$
(f) range: $[-2, 3]$
14. A
15. E
16. $P = 2s + \frac{72}{s}$
17. $y = -2x + 7$
18. (a) $5x + 5h - 3$
(b) $5h$
(c) 5
(d) 5
19. A
20. A

21. $y = -\frac{2}{3}x - 2$

22. $x = -1$ or $x = \frac{1}{3}$

23. x in $(0, 2)$

24. C

25.

