EXERCISES FOR SECTION P.3

In Exercises 1–10, evaluate (if possible) the function at the given value(s) of the independent variable. Simplify the results.

1. $f(x) = 2x - 3$
(a) $f(0)$
(b) $f(-3)$
(c) $f(b)$
(d) $f(x - 1)$

2. $f(x) = \sqrt{x + 3}$
(a) $f(-2)$
(b) $f(6)$
(c) $f(c)$
(d) $f(x + \Delta x)$

3. $g(x) = 3 - x^2$
(a) $g(0)$
(b) $g(\sqrt{3})$
(c) $g(-2)$
(d) $g(t - 1)$

4. $g(x) = x^2(x - 4)$
(a) $g(4)$
(b) $g(\frac{3}{2})$
(c) $g(c)$
(d) $g(t + 4)$

5. $f(x) = \cos 2x$
(a) $f(0)$
(b) $f(-\pi/4)$
(c) $f(\pi/3)$

6. $f(x) = \sin x$
(a) $f(\pi)$
(b) $f(5\pi/4)$
(c) $f(2\pi/3)$

7. $f(x) = x^3$

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

8. $f(x) = 3x - 1$

$$\frac{f(x) - f(1)}{x - 1}$$

9. $f(x) = \dfrac{1}{\sqrt{x - 1}}$

$$\frac{f(x) - f(2)}{x - 2}$$

10. $f(x) = x^3 - x$

$$\frac{f(x) - f(1)}{x - 1}$$

In Exercises 11–16, find the domain and range of the function.

11. $h(x) = -\sqrt{x + 3}$

12. $g(x) = x^2 - 5$

13. $f(t) = \sec \dfrac{\pi t}{4}$

14. $h(t) = \cot t$

15. $f(x) = \dfrac{1}{x}$

16. $g(x) = \dfrac{2}{x - 1}$

In Exercises 17–20, evaluate the function as indicated. Determine its domain and range.

17. $f(x) = \begin{cases} 2x + 1, & x < 0 \\ 2x + 2, & x \geq 0 \end{cases}$
(a) $f(-1)$ (b) $f(0)$ (c) $f(2)$ (d) $f(t^2 + 1)$

18. $f(x) = \begin{cases} x^2 + 2, & x \leq 1 \\ 2x^2 + 2, & x > 1 \end{cases}$
(a) $f(-2)$ (b) $f(0)$ (c) $f(1)$ (d) $f(s^2 + 2)$

19. $f(x) = \begin{cases} |x| + 1, & x < 1 \\ -x + 1, & x \geq 1 \end{cases}$
(a) $f(-3)$ (b) $f(1)$ (c) $f(3)$ (d) $f(b^2 + 1)$

20. $f(x) = \begin{cases} \sqrt{x + 4}, & x \leq 5 \\ (x - 5)^2, & x > 5 \end{cases}$
(a) $f(-3)$ (b) $f(0)$ (c) $f(5)$ (d) $f(10)$

In Exercises 21–28, sketch a graph of the function and find its domain and range. Use a graphing utility to verify your graph.

21. $f(x) = 4 - x$

22. $g(x) = \dfrac{4}{x}$

23. $h(x) = \sqrt{x - 1}$

24. $f(x) = \frac{1}{2}x^3 + 2$

25. $f(x) = \sqrt{9 - x^2}$

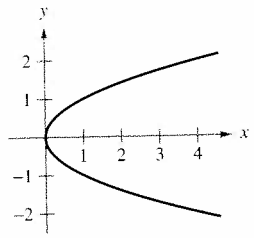
26. $f(x) = x + \sqrt{4 - x^2}$

27. $g(t) = 2 \sin \pi t$

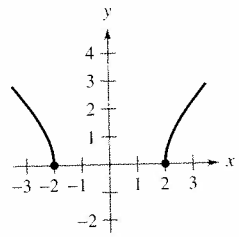
28. $h(\theta) = -5 \cos \dfrac{\theta}{2}$

In Exercises 29–32, use the vertical line test to determine whether y is a function of x. To print an enlarged copy of the graph, go to the website *www.mathgraphs.com*.

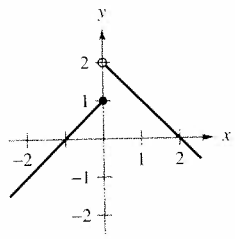
29. $x - y^2 = 0$



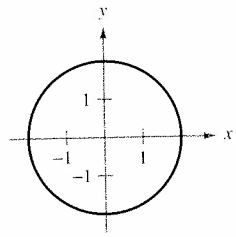
30. $\sqrt{x^2 - 4} - y = 0$



31. $y = \begin{cases} x + 1, & x \leq 0 \\ -x + 2, & x > 0 \end{cases}$



32. $x^2 + y^2 = 4$



In Exercises 33–36, determine whether y is a function of x.

33. $x^2 + y^2 = 4$

34. $x^2 + y = 4$

35. $y^2 = x^2 - 1$

36. $x^2y - x^2 + 4y = 0$

37. ***Think About It*** Express the function

$$f(x) = |x| + |x - 2|$$

without using absolute value signs. (For a review of absolute value, see Appendix D.)

38. ***Writing*** Use a graphing utility to graph the polynomial functions $p_1(x) = x^3 - x + 1$ and $p_2(x) = x^3 - x$. How many zeros does each function have? Is there a cubic polynomial that has no zeros? Explain.