PRACTICE PROBLEMS 1

1. Is the point $(3, 12)$ on the graph of the function $g(x) = x^2 + 5x - 10$?
2. Sketch the graph of the function $h(t) = t^2 - 2$.

EXERCISES 1

Draw the following intervals on the number line.

1. $[-1, 4]$
2. $(4, 3\pi)$ [*Hint:* π is approximately equal to 3.14 . . . .]
3. $[-2, \sqrt{2})$ [*Hint:* $\sqrt{2}$ is approximately equal to 1.41 . . . .]
4. $[1, \frac{3}{2}]$
5. $(-\infty, 3)$
6. $(4, \infty)$

Use intervals to describe the real numbers satisfying the inequalities in Exercises 7–12.

7. $2 \le x < 3$
8. $-1 < x < \frac{3}{2}$
9. $x < 0, x \ge -1$
10. $x \ge -1, 34x < 8$
11. $x < 3$
12. $x \ge \sqrt{2}$
13. If $f(x) = x^2 - 3x$, find $f(0)$, $f(5)$, $f(3)$, and $f(-7)$.
14. If $f(x) = 9 - 6x + x^2$, find $f(0)$, $f(2)$, $f(3)$, and $f(-13)$.
15. If $f(x) = x^3 + x^2 - x - 1$, find $f(1)$, $f(-1)$, $f(\frac{1}{2})$, and $f(a)$.
16. If $g(t) = t^3 - 3t^2 + t$, find $g(2)$, $g(-\frac{1}{2})$, $g(\frac{2}{3})$, and $g(a)$.
17. If $h(s) = s/(1 + s)$, find $h(\frac{1}{2})$, $h(-\frac{3}{2})$, and $h(a + 1)$.
18. If $f(x) = x^2/(x^2 - 1)$, find $f(\frac{1}{2})$, $f(-\frac{1}{2})$, and $f(a + 1)$.
19. If $f(x) = x^2 - 2x$, find $f(a + 1)$ and $f(a + 2)$.
20. If $f(x) = x^2 + 4x + 3$, find $f(a - 1)$ and $f(a - 2)$.

21. An office supply firm finds that the number of Remington typewriters sold in year x is given approximately by the function $f(x) = 50 + 4x + \frac{1}{2}x^2$, where $x = 0$ corresponds to 1980.

(a) What does $f(0)$ represent?

(b) Find the number of Remington typewriters sold in 1982.

22. When a solution of acetylcholine is introduced into the heart muscle of a frog, it diminishes the force with which the muscle contracts. The data from experiments of A. J. Clark are closely approximated by a function of the form

$$R(x) = \frac{100x}{b + x}, \qquad x \geq 0,$$

where x is the concentration of acetylcholine (in appropriate units), b is a positive constant that depends on the particular frog, and $R(x)$ is the response of the muscle to the acetylcholine, expressed as a percentage of the maximum possible effect of the drug.

(a) Suppose that $b = 20$. Find the response of the muscle when $x = 60$.

(b) Determine the value of b if $R(50) = 60$—that is, if a concentration of $x = 50$ units produces a 60% response.

In Exercises 23–26, describe the domain of the function.

23. $f(x) = \dfrac{8x}{(x - 1)(x - 2)}$

24. $f(t) = \dfrac{1}{\sqrt{t}}$

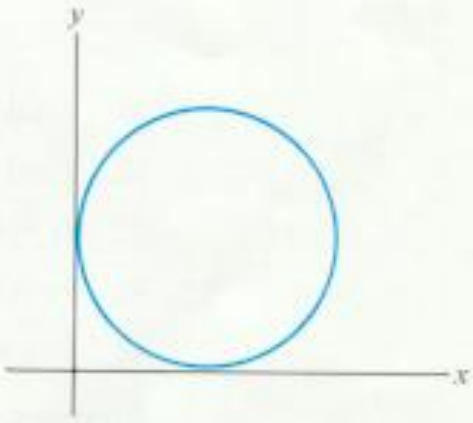
25. $g(x) = \dfrac{1}{\sqrt{3 - x}}$

26. $g(x) = \dfrac{4}{x(x + 2)}$

In Exercises 27–32, decide which curves are graphs of functions.

27.

28.



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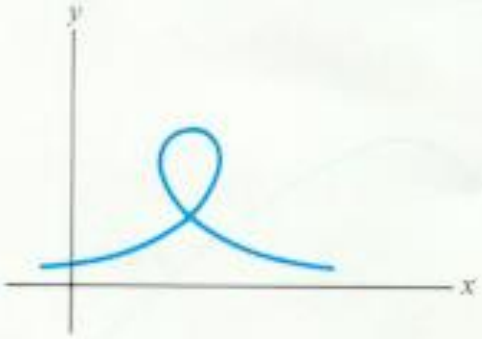

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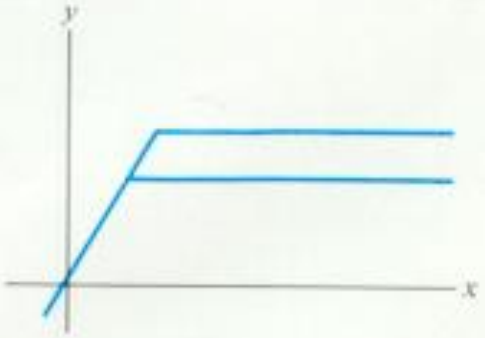

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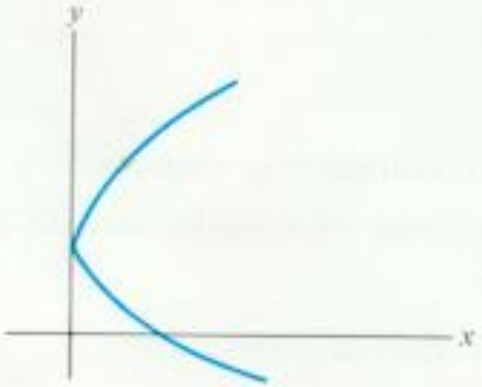

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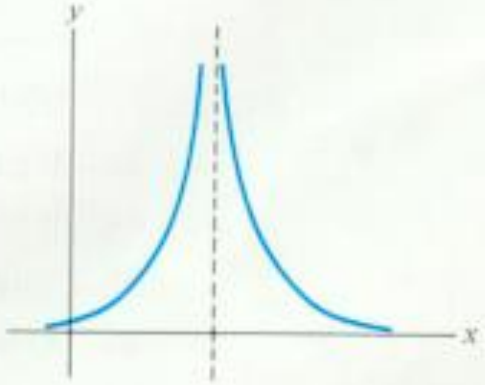

Exercises 33–42 relate to the function whose graph is sketched in Fig. 11.

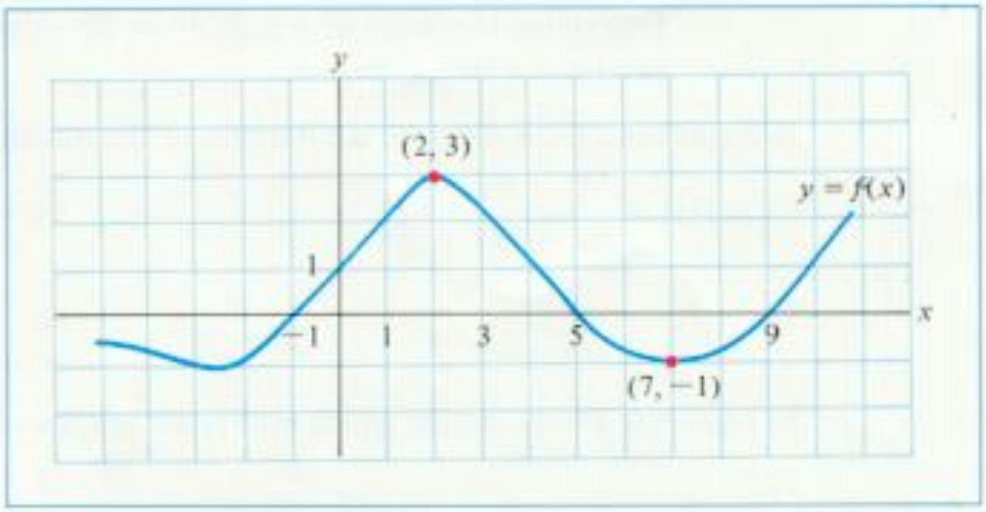

FIGURE 11

33. Find $f(0)$.
34. Find $f(7)$.
35. Find $f(2)$.
36. Find $f(-1)$.
37. Is $f(4)$ positive or negative?
38. Is $f(6)$ positive or negative?
39. Is $f(-\frac{1}{2})$ positive or negative?
40. Is $f(1)$ greater than $f(6)$?
41. For what values of x is $f(x) = 0$?
42. For what values of x is $f(x) \geq 0$?

Exercises 43–46 relate to Fig. 12. When a drug is injected into a person's muscle tiss
the concentration y of the drug in the blood is a function of the time elapsed since t
injection. The graph of a typical time-concentration function f is given in Fig. 12, wh
$t = 0$ corresponds to the time of the injection.

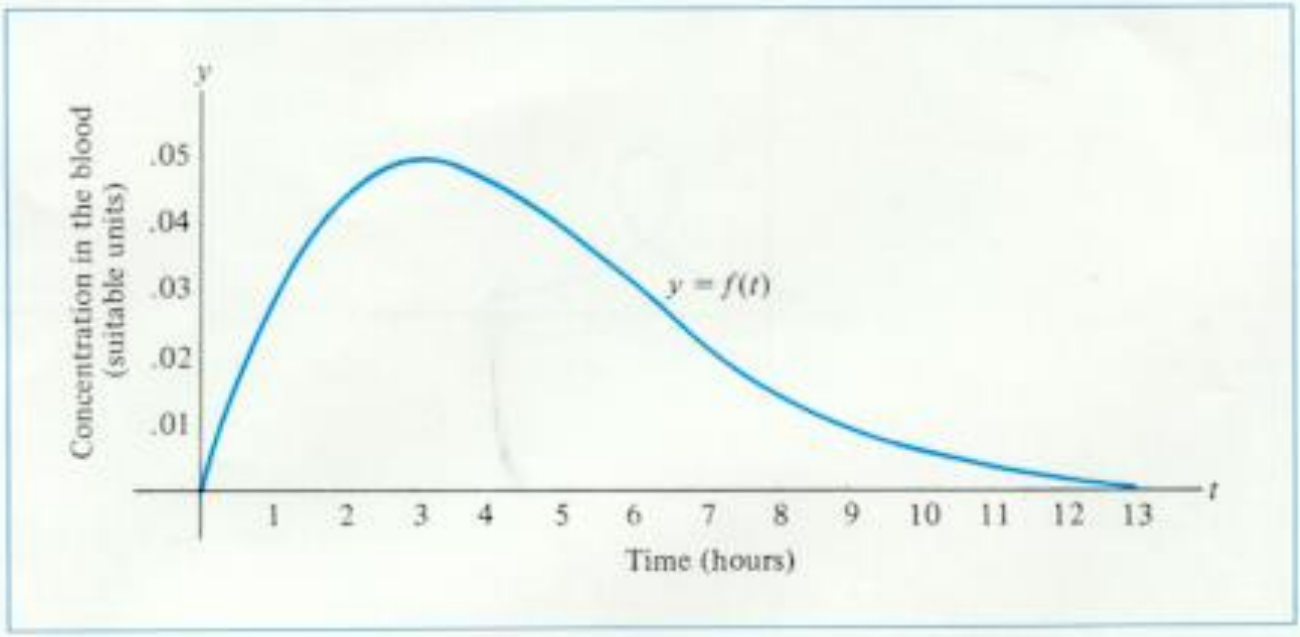

FIGURE 12

43. What is the concentration of the drug when $t = 1$?

44. What is the value of the time-concentration function f when $t = 6$?

45. Find $f(5)$.

46. At what time does $f(t)$ attain its largest value?

47. Is the point $(3, 12)$ on the graph of the function $f(x) = (x - \frac{1}{2})(x + 2)$?

48. Is the point $(-2, 12)$ on the graph of the function $f(x) = x(5 + x)(4 - x)$?