

7-14 ■ Find the domain of the function.

7.  $f(x) = 7x + 15$

8.  $f(x) = \frac{2x + 1}{2x - 1}$

9.  $f(x) = \sqrt{x + 4}$

10.  $f(x) = 3x - \frac{2}{\sqrt{x + 1}}$

11.  $f(x) = \frac{1}{x} + \frac{1}{x + 1} + \frac{1}{x + 2}$

12.  $g(x) = \frac{2x^2 + 5x + 3}{2x^2 - 5x - 3}$

13.  $h(x) = \sqrt{4 - x} + \sqrt{x^2 - 1}$

14.  $f(x) = \frac{\sqrt[3]{2x + 1}}{\sqrt[3]{2x + 2}}$

15-32 ■ Sketch the graph of the function.

15.  $f(x) = 1 - 2x$

16.  $f(x) = \frac{1}{3}(x - 5), \quad 2 \leq x \leq 8$

17.  $f(t) = 1 - \frac{1}{2}t^2$

18.  $g(t) = t^2 - 2t$

19.  $f(x) = x^2 - 6x + 6$

20.  $f(x) = 3 - 8x - 2x^2$

21.  $y = 1 - \sqrt{x}$

22.  $y = -|x|$

23.  $y = \frac{1}{2}x^3$

24.  $y = \sqrt{x + 3}$

25.  $h(x) = \sqrt[3]{x}$

26.  $H(x) = x^3 - 3x^2$

27.  $g(x) = \frac{1}{x^2}$

28.  $G(x) = \frac{1}{(x - 3)^2}$

29.  $f(x) = \begin{cases} 1 - x & \text{if } x < 0 \\ 1 & \text{if } x \geq 0 \end{cases}$

30.  $f(x) = \begin{cases} 1 - 2x & \text{if } x \leq 0 \\ 2x - 1 & \text{if } x > 0 \end{cases}$

31.  $f(x) = \begin{cases} x + 6 & \text{if } x < -2 \\ x^2 & \text{if } x \geq -2 \end{cases}$

32.  $f(x) = \begin{cases} -x & \text{if } x < 0 \\ x^2 & \text{if } 0 \leq x < 2 \\ 1 & \text{if } x \geq 2 \end{cases}$

33. Determine which viewing rectangle produces the most appropriate graph of the function

$$f(x) = 6x^3 - 15x^2 + 4x - 1.$$

(i)  $[-2, 2]$  by  $[-2, 2]$

(ii)  $[-8, 8]$  by  $[-8, 8]$

(iii)  $[-4, 4]$  by  $[-12, 12]$

(iv)  $[-100, 100]$  by  $[-100, 100]$

34. Determine which viewing rectangle produces the most appropriate graph of the function  $f(x) = \sqrt{100 - x^3}$ .

(i)  $[-4, 4]$  by  $[-4, 4]$

(ii)  $[-10, 10]$  by  $[-10, 10]$

(iii)  $[-10, 10]$  by  $[-10, 40]$

(iv)  $[-100, 100]$  by  $[-100, 100]$

35-38 ■ Draw the graph of the function in an appropriate viewing rectangle.

35.  $f(x) = x^2 + 25x + 173$

36.  $f(x) = 1.1x^3 - 9.6x^2 - 1.4x + 3.2$

37.  $y = \frac{x}{\sqrt{x^2 + 16}}$

38.  $y = |x(x + 2)(x + 4)|$

39. Find, approximately, the domain of the function  $f(x) = \sqrt{x^3 - 4x + 1}$ .

40. Find, approximately, the range of the function  $f(x) = x^4 - x^3 + x^2 + 3x - 6$ .

41. Suppose that  $M$  varies directly as  $z$ , and  $M = 120$  when  $z = 15$ . Write an equation that expresses this variation.

42. Suppose that  $z$  is inversely proportional to  $y$ , and that  $z = 12$  when  $y = 16$ . Write an equation that expresses  $z$  in terms of  $y$ .

43. The intensity of illumination  $I$  from a light varies inversely as the square of the distance  $d$  from the light.

(a) Write this statement as an equation.

(b) Determine the constant of proportionality if it is known that a lamp has an intensity of 1000 candles at a distance of 8 m.

(c) What is the intensity of this lamp at a distance of 20 m?

44. The frequency of a vibrating string under constant tension is inversely proportional to its length. If a violin string 12 inches long vibrates 440 times per second, to what length would it have to be shortened to vibrate 660 times per second?

45. The terminal velocity of a parachutist is directly proportional to the square root of his weight. A 160-lb parachutist attains a terminal velocity of 9 mi/h. What is the terminal velocity for a parachutist weighing 240 lb?

46. The maximum range of a projectile is directly proportional to the square of its velocity. A baseball pitcher can throw a ball at 60 mi/h, with a maximum range of 242 ft. What would his maximum range be if he could throw the ball at 70 mi/h?