

Find the domain of the functions in Exercises 5–14 algebraically.

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

6.  $p(t) = \frac{1}{t^2-4}$

7.  $f(t) = \frac{t-3}{3t+9}$

8.  $n(q) = \frac{1}{q^4+2}$

9.  $f(x) = \frac{1}{\sqrt{x-4}}$

10.  $y(t) = \frac{1}{t^4}$

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

12.  $q(r) = \sqrt[3]{r^2-16}$

13.  $m(x) = x^2 - 9$

14.  $t(a) = \sqrt[4]{a-2}$

Find the domain and range of the functions in Exercises 15–16 algebraically.

15.  $m(q) = \frac{1}{5}q - 4$

16.  $f(x) = \sqrt{15-4x}$

Given the domain  $D$  of the functions in Exercises 17–20, find possible values for the unknowns  $a$  and  $b$  (where applicable).

17.  $f(x) = \frac{1}{x-a}$ ,  $D$ : all real numbers  $\neq 3$

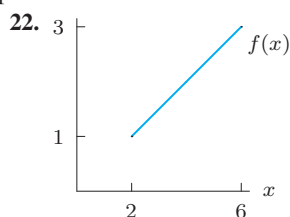
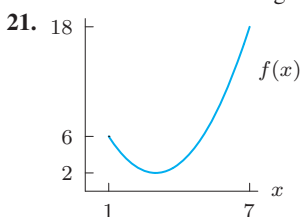
18.  $p(t) = \frac{1}{(2t-a)(t+b)}$ ,  $D$ : all real numbers except 4 and 5.

19.  $m(r) = \sqrt{r-a}$ ,  $D$ : all real numbers  $\geq -3$

20.  $n(q) = \sqrt{r^2+a}$ ,  $D$ : all real numbers

## Problems

In Problems 21–22, estimate the domain and range of the function. Assume the entire graph is shown.



23. Give a formula for a function whose domain is all negative values of  $x$  except  $x = -5$ .

24. Give a formula for a function that is undefined for  $x = -2$  and for  $x < -4$ , but is defined everywhere else.

25. A restaurant is open from 2 pm to 2 am each day, and a maximum of 200 clients can fit inside. If  $f(t)$  is the number of clients in the restaurant  $t$  hours after 2 pm each day, what are a reasonable domain and range for  $f(t)$ ?

26. What is the domain of the function  $f$  giving average monthly rainfall at Chicago's O'Hare airport? (See Table 1.2 on page 5.)

27. A movie theater seats 200 people. For any particular show, the amount of money the theater makes is a function of the number of people,  $n$ , in attendance. If a ticket costs \$4.00, find the domain and range of this function. Sketch its graph.

28. A car gets the best mileage at intermediate speeds. Graph the gas mileage as a function of speed. Determine a reasonable domain and range for the function and justify your reasoning.

29. (a) Use Table 2.7 to determine the number of calories that a person weighing 200 lb uses in a half-hour of walking.<sup>5</sup>

(b) Table 2.7 illustrates a relationship between the number of calories used per minute walking and a person's weight in pounds. Describe in words what is true about this relationship. Identify the dependent and independent variables. Specify whether it is an increasing or decreasing function.

(c) (i) Graph the linear function for walking, as described in part (b), and estimate its equation.

(ii) Interpret the meaning of the vertical intercept of the graph of the function.

(iii) Specify a meaningful domain and range for your function.

(iv) Use your function to determine how many calories per minute a person who weighs 135 lb uses per minute of walking.

**Table 2.7** Calories per minute as a function of weight

Activity	100 lb	120 lb	150 lb	170 lb	200 lb	220 lb
Walking	2.7	3.2	4.0	4.6	5.4	5.9
Bicycling	5.4	6.5	8.1	9.2	10.8	11.9
Swimming	5.8	6.9	8.7	9.8	11.6	12.7

In Problems 30–31, find the domain and range of the function.

30.  $h(x) = \frac{a}{\sqrt{x}}$ , where  $a$  is a constant

31.  $p(x) = |x - b| + 6$ , where  $b$  is a constant

<sup>5</sup>Source: 1993 World Almanac. Speeds assumed are 3 mph for walking, 10 mph for bicycling, and 2 mph for swimming.