EXERCISES

In Exercises 1–6, find the domain and range of each function.

1. $f(x) = 1 + x^2$

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

3. $F(t) = \dfrac{1}{\sqrt{t}}$

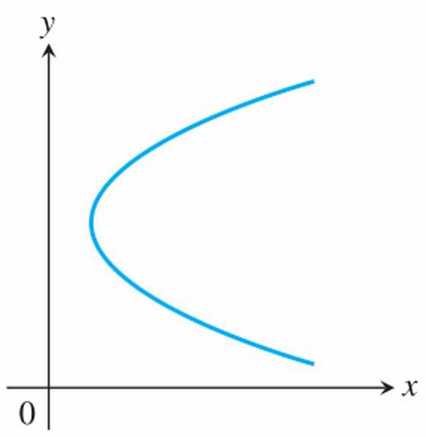
4. $F(t) = \dfrac{1}{1 + \sqrt{t}}$

5. $g(z) = \sqrt{4 - z^2}$

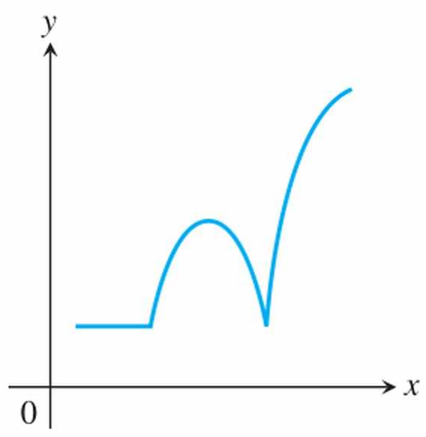
6. $g(z) = \dfrac{1}{\sqrt{4 - z^2}}$

In Exercises 7 and 8, which of the graphs are graphs of functions of x, and which are not? Give reasons for your answers.

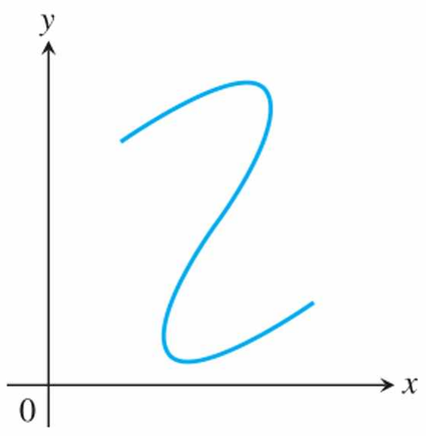
7. a.



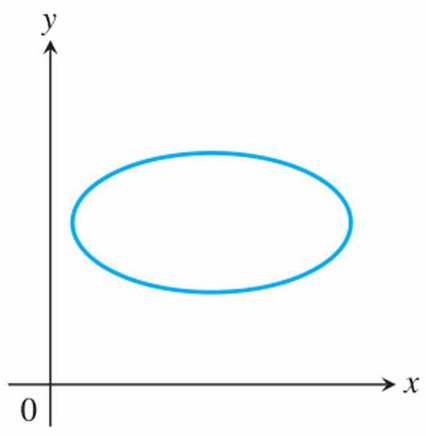
b.



8. a.



b.



Find the domain and graph the functions in Exercises 15–20.

15. $f(x) = 5 - 2x$

16. $f(x) = 1 - 2x - x^2$

17. $g(x) = \sqrt{|x|}$

18. $g(x) = \sqrt{-x}$

19. $F(t) = t/|t|$

20. $G(t) = 1/|t|$

Graph the functions in Exercises 23–26.

23. $f(x) = \begin{cases} x, & 0 \le x \le 1 \\ 2 - x, & 1 < x \le 2 \end{cases}$

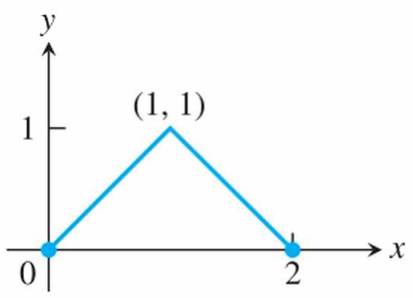
24. $g(x) = \begin{cases} 1 - x, & 0 \le x \le 1 \\ 2 - x, & 1 < x \le 2 \end{cases}$

25. $F(x) = \begin{cases} 3 - x, & x \le 1 \\ 2x, & x > 1 \end{cases}$

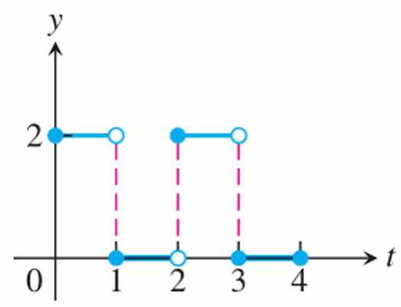
26. $G(x) = \begin{cases} 1/x, & x < 0 \\ x, & 0 \le x \end{cases}$

27. Find a formula for each function graphed.

a.



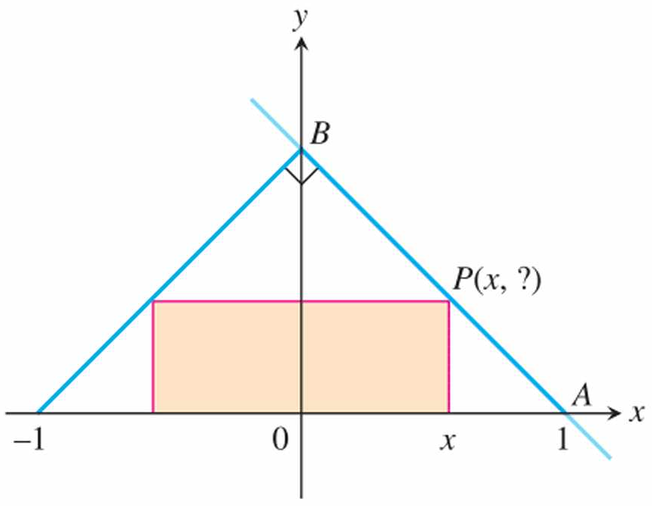
b.



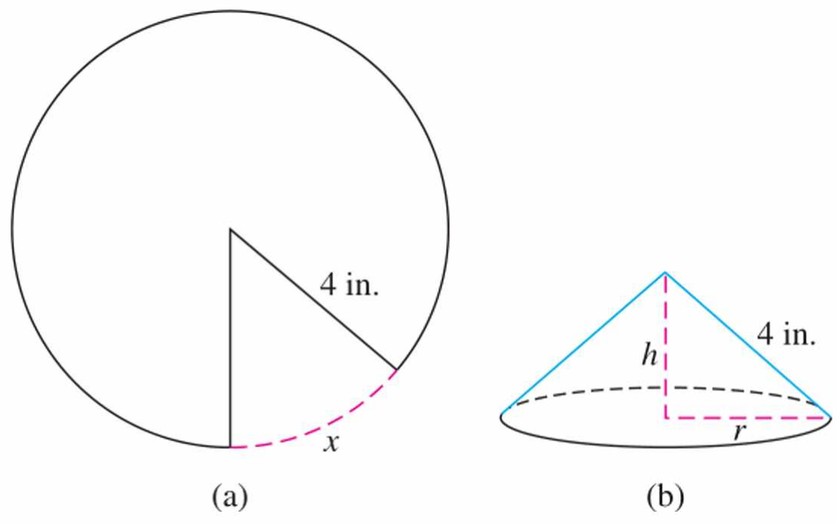
38. The figure shown here shows a rectangle inscribed in an isosceles right triangle whose hypotenuse is 2 units long.

a. Express the y-coordinate of P in terms of x. (You might start by writing an equation for the line AB.)

b. Express the area of the rectangle in terms of x.



39. A cone problem Begin with a circular piece of paper with a 4 in. radius as shown in part (a). Cut out a sector with an arc length of x. Join the two edges of the remaining portion to form a cone with radius r and height h, as shown in part (b).



a. Explain why the circumference of the base of the cone is $8\pi - x$.

b. Express the radius r as a function of x.

c. Express the height h as a function of x.

d. Express the volume V of the cone as a function of x.

EXERCISES

5. If $f(x) = x + 5$ and $g(x) = x^2 - 3$, find the following.

a. $f(g(0))$ **b.** $g(f(0))$

c. $f(g(x))$ **d.** $g(f(x))$

e. $f(f(-5))$ **f.** $g(g(2))$

g. $f(f(x))$ **h.** $g(g(x))$

6. If $f(x) = x - 1$ and $g(x) = 1/(x + 1)$, find the following.

a. $f(g(1/2))$ **b.** $g(f(1/2))$

c. $f(g(x))$ **d.** $g(f(x))$

e. $f(f(2))$ **f.** $g(g(2))$

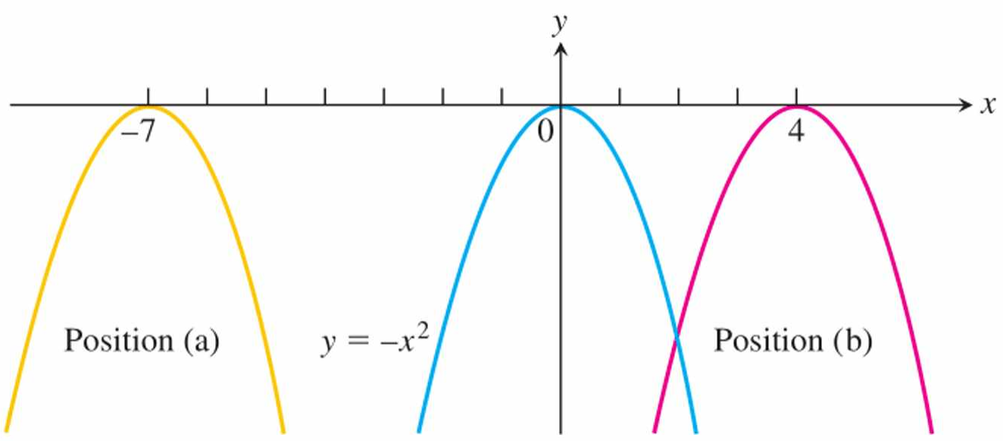
g. $f(f(x))$ **h.** $g(g(x))$

In Exercises 13 and 14, **(a)** write a formula for $f \circ g$ and $g \circ f$ and find the **(b)** domain and **(c)** range of each.

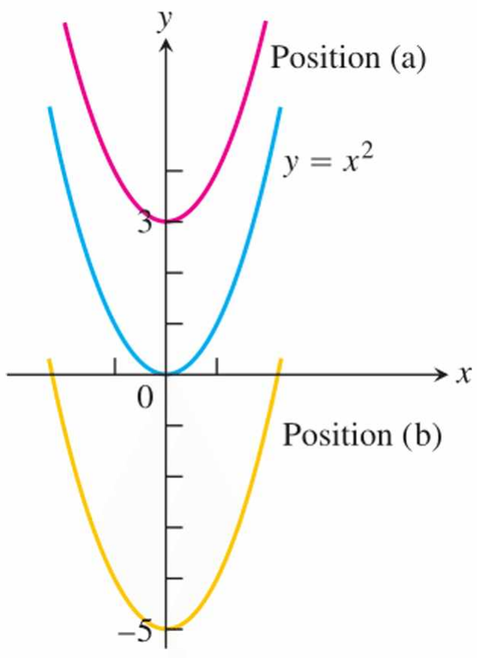
13. $f(x) = \sqrt{x + 1}, \quad g(x) = \dfrac{1}{x}$

14. $f(x) = x^2, \quad g(x) = 1 - \sqrt{x}$

15. The accompanying figure shows the graph of $y = -x^2$ shifted to two new positions. Write equations for the new graphs.



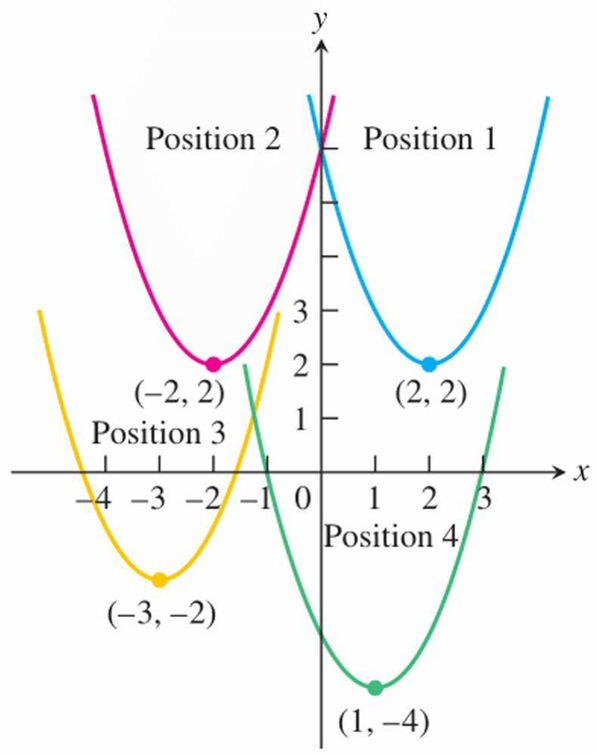
16. The accompanying figure shows the graph of $y = x^2$ shifted to two new positions. Write equations for the new graphs.



17. Match the equations listed in parts (a)–(d) to the graphs in the accompanying figure.

a. $y = (x - 1)^2 - 4$ **b.** $y = (x - 2)^2 + 2$

c. $y = (x + 2)^2 + 2$ **d.** $y = (x + 3)^2 - 2$



Graph the functions applying an appropriate transformation.

29. $y = \sqrt{x + 4}$ **30.** $y = \sqrt{9 - x}$

31. $y = |x - 2|$ **32.** $y = |1 - x| - 1$

33. $y = 1 + \sqrt{x - 1}$ **34.** $y = 1 - \sqrt{x}$

41. $y = \dfrac{1}{x - 2}$ **42.** $y = \dfrac{1}{x} - 2$

61. $y = -\sqrt{2x + 1}$ **62.** $y = \sqrt{1 - \dfrac{x}{2}}$

63. $y = (x - 1)^3 + 2$ **64.** $y = (1 - x)^3 + 2$

65. $y = \dfrac{1}{2x} - 1$ **66.** $y = \dfrac{2}{x^2} + 1$

67. $y = -\sqrt[3]{x}$ **68.** $y = (-2x)^{2/3}$