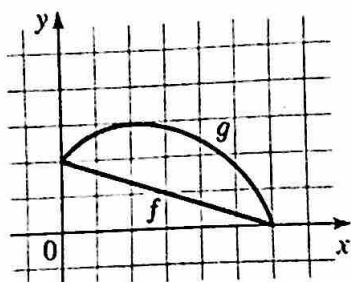
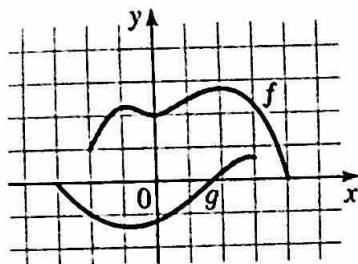


11–12 ■ Use graphical addition to sketch the graph of  $f + g$ .

11.



12.



13–16 ■ Draw the graphs of  $f$ ,  $g$ , and  $f + g$  on a common screen to illustrate graphical addition.

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

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

15.  $f(x) = x^2$ ,  $g(x) = \frac{1}{3}x^3$

16.  $f(x) = \sqrt[4]{1-x}$ ,  $g(x) = \sqrt{1-\frac{x^2}{9}}$

17–22 ■ Use  $f(x) = 3x - 5$  and  $g(x) = 2 - x^2$  to evaluate the expression.

17. (a)  $f(g(0))$

(b)  $g(f(0))$

18. (a)  $f(f(4))$

(b)  $g(g(3))$

19. (a)  $(f \circ g)(-2)$

(b)  $(g \circ f)(-2)$

20. (a)  $(f \circ f)(-1)$

(b)  $(g \circ g)(2)$

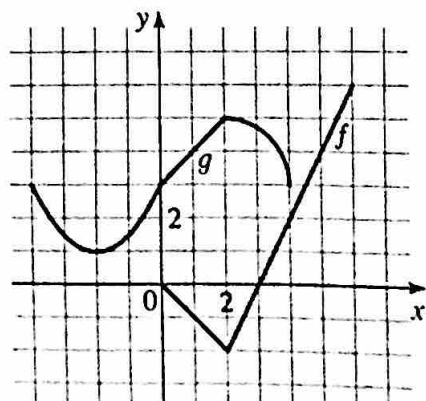
21. (a)  $(f \circ g)(x)$

(b)  $(g \circ f)(x)$

22. (a)  $(f \circ f)(x)$

(b)  $(g \circ g)(x)$

23–28 ■ Use the given graphs of  $f$  and  $g$  to evaluate the expression.



23.  $f(g(2))$

24.  $g(f(0))$

25.  $(g \circ f)(4)$

26.  $(f \circ g)(0)$

27.  $(g \circ g)(-2)$

28.  $(f \circ f)(4)$

29–40 ■ Find the functions  $f \circ g$ ,  $g \circ f$ ,  $f \circ f$ , and  $g \circ g$  and their domains.

29.  $f(x) = 2x + 3$ ,  $g(x) = 4x - 1$

30.  $f(x) = 6x - 5$ ,  $g(x) = \frac{x}{2}$

31.  $f(x) = x^2$ ,  $g(x) = x + 1$

32.  $f(x) = x^3 + 2$ ,  $g(x) = \sqrt[3]{x}$

33.  $f(x) = \frac{1}{x}$ ,  $g(x) = 2x + 4$

34.  $f(x) = x^2$ ,  $g(x) = \sqrt{x-3}$

35.  $f(x) = |x|$ ,  $g(x) = 2x + 3$

36.  $f(x) = x - 4$ ,  $g(x) = |x + 4|$

37.  $f(x) = \frac{x}{x+1}$ ,  $g(x) = 2x - 1$

38.  $f(x) = \frac{1}{\sqrt{x}}$ ,  $g(x) = x^2 - 4x$

39.  $f(x) = \sqrt[3]{x}$ ,  $g(x) = \sqrt[4]{x}$

40.  $f(x) = \frac{2}{x}$ ,  $g(x) = \frac{x}{x+2}$

41–44 ■ Find  $f \circ g \circ h$ .

41.  $f(x) = x - 1$ ,  $g(x) = \sqrt{x}$ ,  $h(x) = x - 1$

42.  $f(x) = \frac{1}{x}$ ,  $g(x) = x^3$ ,  $h(x) = x^2 + 2$

43.  $f(x) = x^4 + 1$ ,  $g(x) = x - 5$ ,  $h(x) = \sqrt{x}$

44.  $f(x) = \sqrt{x}$ ,  $g(x) = \frac{x}{x-1}$ ,  $h(x) = \sqrt[3]{x}$

45–50 ■ Express the function in the form  $f \circ g$ .

45.  $F(x) = (x - 9)^5$

46.  $F(x) = \sqrt{x} + 1$

and their

$$47. G(x) = \frac{x^2}{x^2 + 4}$$

$$48. G(x) = \frac{1}{x + 3}$$

$$49. H(x) = |1 - x^3|$$

$$50. H(x) = \sqrt{1 + \sqrt{x}}$$

51-54 ■ Express the function in the form  $f \circ g \circ h$ .

$$51. F(x) = \frac{1}{x^2 + 1}$$

51

$$52. F(x) = \sqrt[3]{\sqrt{x} - 1}$$

$$53. G(x) = (4 + \sqrt[3]{x})^9$$

$$54. G(x) = \frac{2}{(3 + \sqrt{x})^2}$$

5

## Applications

55-56 ■ **Revenue, Cost, and Profit** A print shop makes bumper stickers for election campaigns. If  $x$  stickers are ordered (where  $x < 10,000$ ), then the price per sticker is  $0.15 - 0.000002x$  dollars, and the total cost of producing the order is  $0.095x - 0.0000005x^2$  dollars.

55. Use the fact that

$$\text{revenue} = \text{price per item} \times \text{number of items sold}$$

to express  $R(x)$ , the revenue from an order of  $x$  stickers, as a product of two functions of  $x$ .

56. Use the fact that

$$\text{profit} = \text{revenue} - \text{cost}$$

to express  $P(x)$ , the profit on an order of  $x$  stickers, as a dif-