

## 2.6 In-class Practice

1. For each pair of functions, find  $(f \pm g)(x)$ ,  $(fg)(x)$ ,  $\left(\frac{f}{g}\right)(x)$ , and the domain of each of the new function.

a)  $f(x) = 6 - 3x$ ,  $g(x) = -4x + 1$

b)  $f(x) = 4x^2 + 2x$ ,  $g(x) = x^2 - 3x + 2$

c)  $f(x) = \sqrt{5x - 4}$ ,  $g(x) = -\frac{1}{x}$

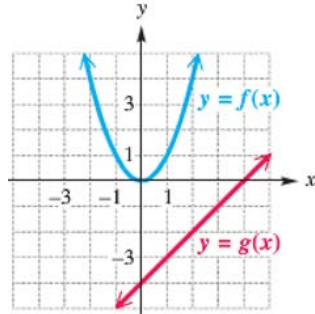
2. Use the given graph to find:

a)  $(f + g)(2)$

$(f - g)(1)$

$(fg)(0)$

$\left(\frac{f}{g}\right)(1)$

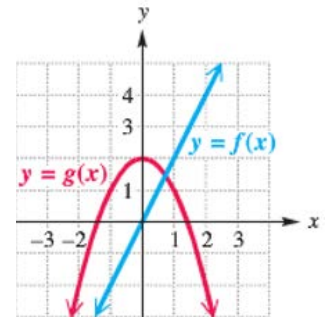


b)  $(f + g)(0)$

$(f - g)(-1)$

$(fg)(1)$

$\left(\frac{f}{g}\right)(2)$



3. Find the difference quotient  $\frac{f(x+h)-f(x)}{h}$ , for each of the given functions:

a)  $f(x) = 3x + 2$

b)  $f(x) = -2x + 4$

c)  $f(x) = x^2 + 5$

d)  $f(x) = \frac{1}{x^2}$

e)  $f(x) = 1 - x^2$

f)  $f(x) = x^2 - 3x + 2$

g)  $f(x) = \sqrt{x + 1}$

h)  $f(x) = \frac{1}{2x-1}$

4. If  $f(x) = 2x - 3$  and  $g(x) = 3 - x^2$ , find

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

b)  $(g \circ f)(3)$

c)  $(f \circ f)(2)$

d)  $(g \circ g)(-2)$

5. Given functions  $f$  and  $g$ , find  $(f \circ g)(x)$  and  $(g \circ f)(x)$  and its domains.

a)  $f(x) = \sqrt{x}$ ,  $g(x) = x - 4$

b)  $f(x) = \sqrt{x - 1}$ ,  $g(x) = x^2 + 1$

c)  $f(x) = \frac{4}{x}$ ,  $g(x) = x + 4$

d)  $f(x) = \sqrt{x}$ ,  $g(x) = \frac{3}{x+6}$

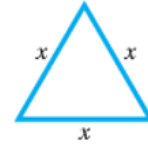
e)  $f(x) = \frac{1}{x+4}$ ,  $g(x) = -\frac{1}{x}$

f)  $f(x) = x^2$ ,  $g(x) = 3x + 1$

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6. **Relationship of Measurement Units** The function defined by  $f(x) = 12x$  computes the number of inches in  $x$  feet, and the function defined by  $g(x) = 5280x$  computes the number of feet in  $x$  miles. What does  $(f \circ g)(x)$  compute?

7. **Area of an Equilateral Triangle** The area of an equilateral triangle with sides of length  $x$  is given by the function defined by  $\mathcal{A}(x) = \frac{\sqrt{3}}{4}x^2$ .



- (a) Find  $\mathcal{A}(2x)$ , the function representing the area of an equilateral triangle with sides of length twice the original length.
- (b) Find the area of an equilateral triangle with side length 16. Use the formula  $\mathcal{A}(2x)$  found in part (a).
8. **Software Author Royalties** A software author invests his royalties in two accounts for 1 yr.
- (a) The first account pays 4% simple interest. If he invests  $x$  dollars in this account, write an expression for  $y_1$  in terms of  $x$ , where  $y_1$  represents the amount of interest earned.
- (b) He invests in a second account \$500 more than he invested in the first account. This second account pays 2.5% simple interest. Write an expression for  $y_2$ , where  $y_2$  represents the amount of interest earned.
- (c) What does  $y_1 + y_2$  represent?
- (d) How much interest will he receive if \$250 is invested in the first account?
9. **Emission of Pollutants** When a thermal inversion layer is over a city (as happens in Los Angeles), pollutants cannot rise vertically but are trapped below the layer and must disperse horizontally. Assume that a factory smokestack begins emitting a pollutant at 8 A.M. Assume that the pollutant disperses horizontally over a circular area. If  $t$  represents the time, in hours, since the factory began emitting pollutants ( $t = 0$  represents 8 A.M.), assume that the radius of the circle of pollutants at time  $t$  is  $r(t) = 2t$  miles. Let  $\mathcal{A}(r) = \pi r^2$  represent the area of a circle of radius  $r$ .
- (a) Find  $(\mathcal{A} \circ r)(t)$ .    (b) Interpret  $(\mathcal{A} \circ r)(t)$ .
- (c) What is the area of the circular region covered by the layer at noon?