

Section 1.6  
Combinations of Functions

If  $f(x)$  and  $g(x)$  are functions, we define the following functions:

1.  $(f + g)(x) =$
2.  $(f - g)(x) =$
3.  $(f \cdot g)(x) =$
4.  $\left(\frac{f}{g}\right)(x) =$  provided \_\_\_\_\_

**Example 1:** If  $f(x) = x^2 + 5$  and  $g(x) = 2x - 3$ , find the following functions and simplify.

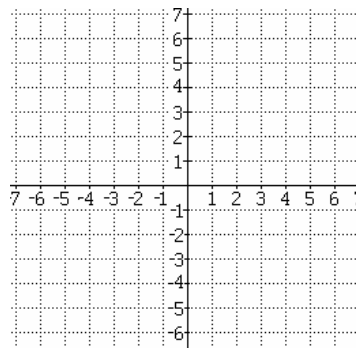
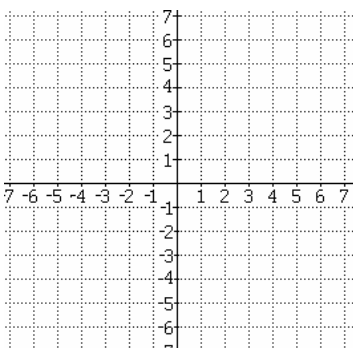
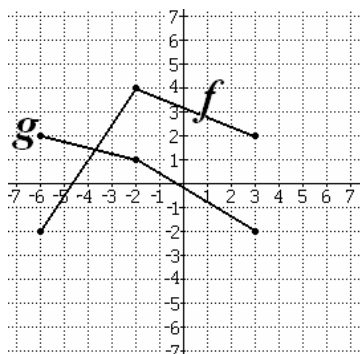
- a.  $(f + g)(x)$  b.  $(f - g)(x)$

- b.  $(f \cdot g)(x)$  d.  $\left(\frac{f}{g}\right)(x)$

**Example 2:** If  $f(x)$  and  $g(x)$  are given as below, find  $(f + g)(x)$  and  $(f - g)(x)$ .

a.  $f + g$

b.  $f - g$



**Composition of functions: (very important!!!)**

5.  $(f \circ g)(x) =$  "f of g of x"

6.  $(g \circ f)(x) =$  "g of f of x"

**Example 3:** If  $f(x) = x^2 - x$  and  $g(x) = x - 2$  find:

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

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

c.  $(g \circ g)(x)$

**NOTE:**  $(f \circ g)(x)$  and  $(g \circ f)(x)$  may not be equal. (Compare Example 3 part a and part b.)

**Example 4:** If  $f(x) = 5x + 4$  and  $g(x) = 4 - x$ , find:

a.  $(f + g)(-3 + a)$

b.  $(f \cdot g)(1)$

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

d.  $(g \circ f)(2)$

**Example 5:** If  $f(x) = \sqrt{x+3}$  and  $g(x) = \frac{2}{x}$ , find:

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

d.  $(f \circ f)(2)$