

## Section 1.8 Combinations of Functions: Composite Functions

**Objective:** In this lesson you learned how to find arithmetic combinations and compositions of functions.

Course Number

Instructor

Date

### I. Arithmetic Combinations of Functions (Pages 84–85)

Just as two real numbers can be combined with arithmetic operations, two functions can be combined by the operations of

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to create new functions. A combined function like this is called an **arithmetic combination of functions**.

The domain of an arithmetic combination of functions  $f$  and  $g$  consists of . . .

#### *What you should learn*

How to add, subtract, multiply, and divide functions

Let  $f$  and  $g$  be two functions with overlapping domains. Complete the following arithmetic combinations of  $f$  and  $g$  for all  $x$  common to both domains:

1) Sum:  $(f + g)(x) =$  \_\_\_\_\_

2) Difference:  $(f - g)(x) =$  \_\_\_\_\_

3) Product:  $(fg)(x) =$  \_\_\_\_\_

4) Quotient:  $\left(\frac{f}{g}\right)(x) =$  \_\_\_\_\_

**Example 1:** Let  $f(x) = 7x - 5$  and  $g(x) = 3 - 2x$ . Find  $(f - g)(4)$ .

### II. Composition of Functions (Pages 86–87)

The **composition** of the function  $f$  with the function  $g$  is defined as  $(f \circ g)(x) =$  \_\_\_\_\_.

#### *What you should learn*

How to find the composition of one function with another function

For the composition of the function  $f$  with  $g$ , the domain of  $(f \circ g)$  is . . .

For two functions  $f$  and  $g$ , to find  $(f \circ g)(x)$ , . . .

**Example 2:** Let  $f(x) = 3x + 4$  and let  $g(x) = 2x^2 - 1$ . Find  
(a)  $(f \circ g)(x)$  and (b)  $(g \circ f)(x)$ .

To “decompose” a composite function, . . .

**Example 3:** Write the function given by  $h(x) = |2x - 5| + 1$   
as a composition of two functions.

### III. Applications of Combinations of Functions (Page 88)

The function  $f(x) = 0.06x$  represents the sales tax owed on a purchase with a price tag of  $x$  dollars and the function  $g(x) = 0.75x$  represents the sale price of an item with a price tag of  $x$  dollars during a 25% off sale. Using one of the combinations of functions discussed in this section, write the function that represents the sales tax owed on an item with a price tag of  $x$  dollars during a 25% off sale.

***What you should learn***  
How to use combinations of functions to model and solve real-life problems

#### Homework Assignment

Page(s)

Exercises