

## Section 2.8: Function Operations and Composition

### Video 1

1) For  $f(x) = 2x^2 + 3$  and  $g(x) = 4x - 5$ , find the following.

a)  $(f + g)(5)$

b)  $(f - g)(-3)$

c)  $(f \cdot g)(0)$

d)  $\left(\frac{f}{g}\right)(8)$

2) For  $f(x) = x^2 - 2x + 7$  and  $g(x) = 2x + 9$ , find the following.

a)  $(f + g)(x)$

b)  $(f - g)(x)$

c)  $(f \cdot g)(x)$

d)  $\left(\frac{f}{g}\right)(x)$

e) Give the domains of the functions in parts a through d.

## Video 2

The **difference quotient** for a function is similar to the formula for average rate of change. We use it a great deal in calculus.

$$\frac{f(x+h) - f(x)}{h}$$

To simplify this quotient:

- Evaluate  $f(x+h)$ .
- Subtract the original function from this. That gives you the numerator.
- Place the numerator over  $h$ , and simplify. Usually, you will be able to factor a common factor of  $h$  from the numerator.

3) Find the difference quotient for  $f(x) = 3x^2 - 7x - 20$ .

4) Find the difference quotient for  $f(x) = 9x - 16$ .

**Video 3**

5) Let  $f(x) = \sqrt{x+9}$  and  $g(x) = \frac{6}{x}$ . Find the following.

a)  $(f \circ g)(-3)$

b)  $(g \circ f)(7)$

6) Given that  $f(x) = \sqrt{x-4}$  and  $g(x) = 3x+7$ . Find the following functions and state their domains.

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

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

7) Given that  $f(x) = x^2 + 4x + 8$  and  $g(x) = 2x - 15$ . Find the following functions and state their domains.

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

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

8) Given that  $f(x) = \frac{6}{x-3}$  and  $g(x) = \frac{10}{x}$ . Find the following functions and state their domains.

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

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

9) Find two functions  $f(x)$  and  $g(x)$  that have the given composition.

a)  $(f \circ g)(x) = 2(3x+5)^2 - 8(3x+5) + 13$

b)  $(f \circ g)(x) = \frac{1}{x+3} + 9$