Notes for 2.7 Operations on Functions, Composition of Functions (pp. 268 - 275)

Name:
Date:
Instructor:

Topics: Add, Subtract, Multiply, Divide and Compose Two Functions

I. Arithmetic Operations of Functions(pp. 268 – 270)
Given two functions *f* and *g*, then for all values of *x* for which both *f(x)* and *g(x)* are defined as:
A. *(f + g)(x)* = _____ (*Combine similar terms.)
B. *(f – g)(x)* = _____ (*Distribute the negative 1 through the second function, then combine similar terms.)
C. *(fg)(x)* = _____(*Multiply the two functions together using FOIL, distributive property or just writing them side-by-side, as on the video)
D. $\left(\frac{f}{g}\right)(x) =$ _____ (*Write as a single fraction and reduce when appropriate. Exclude all values that would make the denominator become 0 when substituted in for *x*.)

*Omit problems concerning the domain of the result. This is not tested in this course. Sorry that it's scattered throughout the video.
*Always write out the operation's definition above as the first step of the solution, then evaluate at a number or clean up as outlined above.

Ex. $f(x) = x^2 - 4$ and $g(x) = \sqrt{x}$
a. *(f + g)(9)* =

b. *(f + g)(x)* =

c. *(f – g)(0)* =

d. *(f – g)(x)* =

e. *(fg)(1)* =

f. *(fg)(x)* =

g. $\left(\frac{f}{g}\right)(4) =$

h. $\left(\frac{f}{g}\right)(x) =$

*The Difference Quotient (p. 271) is heavily emphasized in this course. Be sure to review and learn Example 4 and any other examples that your instructor works.

II. Composition of Two Functions

Composition is another operation that can happen to two functions making them result in a two-step process. In general, if *f* and *g* are functions, then the **composition of *g* and *f*** is

$(g \circ f)(x) = g(f(x))$ for all *x* in the domain of *f* such that *f(x)* (the answer) is in the domain of *g*.

*Always change the notation first out of the $\circ$ and into the compound function style. "Clear the fog", then make the substitution and simplify when needed.

Ex. Given $f(x) = \frac{3}{x^4}$ and $g(x) = 2 - x$

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

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

III. Decomposition of Functions

The **decomposition** of a function is going backwards in the composition. You state two functions that, when composed, result in the problem. (*These can easily be checked.)

Ex. Given $h(x) = \sqrt{x^2 - 9}$. Find the functions *f* and *g* such that $(f \circ g)(x) = h(x)$.

Assignment:
pp. 276 – 279 #1 – 13 odd, 31 – 39 odd, 40, 41 – 53 odd, 57, 59, 73 - 78