Section 4.2 Notes: Operations on Functions

Given f and g are functions…

1. **Sum** of f and g: $(f+g)(x) = f(x) + g(x)$

2. **Difference** of f and g: $(f-g)(x) = f(x) - g(x)$

3. **Product** of f and g: $(f \cdot g)(x) = f(x) \cdot g(x)$

4. **Quotient** of f and g: $\left(\frac{f}{g}\right)(x) = \frac{f(x)}{g(x)}$, provided $g(x) \neq 0$

Example 1

Given $f(x) = x^2$ and $g(x) = x + 1$

SUM

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

DIFFERENCE

$$(f-g)(x) = (x^2) - (x+1) = x^2 - x - 1$$

PRODUCT

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

The Composite Function

- Given functions *f* and *g*, denoted $(f \circ g)(x) = f\left(g(x)\right)$
- Read as "f of g" (the open circle is NOT a multiplication symbol)
- x is in the domain of function *g* and *g*(x) is in the domain of function *f*

Example 2

Given $f(x) = x^2$ and $g(x) = x + 1$, find $(f \circ g)(x)$.

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

x^2+2x+1

Example 3

Using the same equations above, find $(g \circ f)(x)$.

$g(x^2) = (x^2) + 1$

x^2+1

Homework (in class) page 127 CE #5 - 10 all

Given $f(x) = x^2 + x$ and $g(x) = x + 1$

5. (f + g)(x)

6. (f - g)(x)

7. (f·g)(x)

8. (f÷g)(x)

9. a) f(g(2))

b) (f∘g)(x)

10. a) (g∘f)(2)

b) (g∘f)(x)