§ 2.6 Combinations of Functions

Operations on Functions

If f and g are functions, then for all values of x for which both f(x) and g(x) exist,

- the SUM of f and g is defined by: $(f + g)(x) = f(x) + g(x)$
- the DIFFERENCE of f and g is defined by: $(f - g)(x) = f(x) - g(x)$
- the PRODUCT of f and g is defined by: $(f \bullet g)(x) = f(x) \bullet g(x)$
- the QUOTIENT of f and g is defined by: $\left(\frac{f}{g}\right)(x) = \frac{f(x)}{g(x)}$,

where $g(x) \neq 0$.

Example 1: Let $f(x) = x^2$, and $g(x) = x + 1$ Find:

a) $(f + g)(x)$ b) $(f - g)(x)$ c) $(f \bullet g)(x)$

d) $(f/g)(x)$ e) $(f - g)(10)$.

Composition of Functions:

If f and g are functions, then the <u>composite</u> function or <u>composition</u>, of g and f is:

$(g \circ f)(x) = g[f(x)]$ (Note: this is read "g of f of x".)

for all x in the domain of f such that f(x) is in the domain of g.

Example 2: Let $f(x) = x + 2$, and $g(x) = 4x - 5$

Find $(f \circ g)(x)$ and $(g \circ f)(x)$ also find $(g \circ f)(1)$