

## 2.6 Operations on Functions: Composite Functions

$f$  &  $g$  are functions for the following:

**Sum of Functions** :  $f + g$  is defined by

$$(f+g)(x) = f(x) + g(x)$$

**Difference**:  $f - g$

$$(f-g)(x) = f(x) - g(x)$$

**Product**:  $f \cdot g$

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

**Quotient**:  $f/g$

$$(f/g)(x) = f(x)/g(x)$$

Ex. 1  $f(x) = x^2 + 9$      $g(x) = 3x + 5$  Find all 4 operations

Ex. 2  $f(x) = 1/(x+2)$

$g(x) = x/(x-1)$

Find all 4 operations

## Composite Function

Given 2 functions  $f$  &  $g$ , the composite function, denoted by  $f \circ g$  read "f composed with g" defined by:  $(f \circ g)(x) = f(g(x))$ .

The domain of  $f \circ g$  is the set of all numbers  $x$  in the domain of  $g$  such that  $g(x)$  is in the domain of  $f$ . Look at pg. 150

Ex. 3 Evaluating a composite function

$$f(x) = 2x^2 - 3 \quad g(x) = 4x$$

a)  $(f \circ g)(1)$       b)  $(g \circ f)(1)$       c)  $(f \circ f)(-2)$

Ex. 4 Finding a composite function

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

Find  $(f \circ g)(x)$  & state the domain

Ex. 5 Find domain of  $(f \circ g)(x)$  if  $f(x) = 1/(x+2)$  &  $g(x) = 4/(x-1)$

Ex. 6 Showing that 2 composite functions are equal if  
 $f(x) = 3x - 4$  &  $g(x) = 1/3(x + 4)$ . Show that  $(f \circ g)(x) = (g \circ f)(x)$  for every  $x$ .