1.3 TRANSFORMATION OF A SINGLE FUNCTION

- Suppose you have the graph of a function f
- Suppose c > 0

Vertical and Horizontal Shifts

- The graph of g(x) = f(x) + c is the same as the graph of f shifted upwards by c units.
- The graph of g(x) = f(x) - c is the same as the graph of f shifted downwards by c units.
- The graph of g(x) = f(x+c) is the same as the graph of f shifted to the left by c units.
- The graph of g(x) = f(x-c) is the same as the graph of f shifted to the right by c units.

Vertical and Horizontal Stretching

- The graph of g(x) = c.f(x) is the same as the graph of f stretched vertically by a factor of c
- The graph of g(x) = f(x)/c is the same as the graph of f compressed vertically by a factor of c
- The graph of g(x) = f(c.x) is the same as the graph of f compressed horizontally by a factor of c
- The graph of g(x) = f(x/c) is the same as the graph of f stretched horizontally by a factor of c

Vertical and Horizontal Reflecting

- The graph of g(x) = -f(x) is the reflection of the graph of f about the x axis
- The graph of g(x) = f(-x) is the reflection of the graph of f about the y axis

COMBINATIONS OF TWO FUNCTIONS

- Suppose you have two functions f and g,
- Define the following functions:

Algebra of Functions

- (f+g)(x) = f(x) + g(x)
- (f-g)(x) = f(x) - g(x)
- (f.g)(x) = f(x).g(x)
- (f/g)(x) = f(x) / g(x) This is defined only for values of x s.t. $g(x) \neq 0$

Composition of Functions

- The **composite function** $f \circ g$, also called the **composition** of f and g, is defined by:
- $(f \circ g)(x) = f(g(x))$