Chapter 2 - Functions and Transformations

A function is a relation that maps inputs to outputs.

- ∟ The function has both y and x values
- ∟ The x value imputed in the function is called the domain
- ∟ The y value output by the function is called the range

Composite functions are formed when you combined two or more functions, for example:

$$f(x) = 3x + 2 \qquad g(x) = 7 - x$$

Therefore, fg(x) would be the function g entered as an input of x in function f and simplified

$$f(x) = 3(7 - x) + 2$$

The function inverse is the reflection of the function in the line $y = x$ changing all x coordinates to y coordinates and y to x, thus switching the range and domain of a function.

How to find the inverse function

Make f(x) as y and then make x the subject of the equation then replace y as x, for example:

$$f(x) = 3x + 2$$

$$y = 3x + 2$$
$$y - 2 = 3x$$
$$(y - 2)/3 = x$$

So the inverse of f(x) is (x-2)/3

Transformations of the functions

- ∟ For any function f(x), the graph of $y = f(x) + a$ can be obtained from the graph of $y = f(x)$ by translating it through a unit in the positive y direction.
- ∟ For any function f(x), the graph of $y = f(x - a)$ can be obtained from the graph of $y = f(x)$ by translating it through a unit in the positive x direction.
- ∟ For any function f(x), the graph of $y = f(x - s) + t$ can be obtained from the graph of $y = f(x)$ by translating it through s units in the positive x direction and t units in the positive y direction.
- ∟ For any function f(x), and any positive value of a, the graph of $y = af(x)$ can be obtained from the graph of $y = f(x)$ by a stretch of the scale factor a parallel to the y-axis
- ∟ For any function f(x), and any positive value of a, the graph of $y = f(ax)$ can be obtained from the graph of $y = f(x)$ by a stretch of scale factor 1 parallel to the x-axis.