

## EG02021 Mathematics

## Class 1: Functions

**Function****Problem:**

Given the function  $h(p) = p^2 + 2p$

- a) Evaluate  $h(4)$   
 b) Solve  $h(p) = 3$

**□ Domain and Range**

**Various Functions** (Constant Function, Identity Function, Quadratic Function, Cubic Function, Reciprocal, Reciprocal squared, Cube Root, Square Root, Absolute Value Function)

**Problem:**

Find the domain of each function: a)  $f(x) = 2\sqrt{x+4}$  b)  $g(x) = \frac{3}{6-3x}$

**□ Rate of Change**

**Example:** Given the function  $g(t)$  shown here,  $h(p) = p^2 + 2p$ , find the average rate of change on the interval  $[0, 3]$ .

**□ Average Rate of Change using Function Notation**

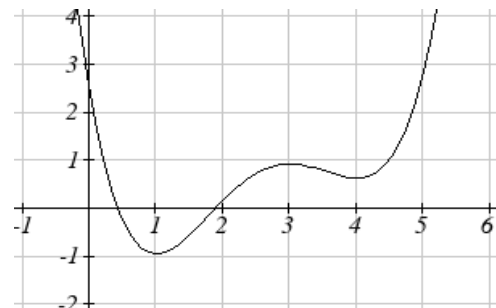
Given a function  $f(x)$ , the average rate of change on the interval  $[a, b]$  is

$$\text{Average rate of change} = \frac{\text{Change of Output}}{\text{Change of Input}} = \frac{f(b) - f(a)}{b - a}$$

**Problem:** Compute the average rate of change of  $f(x) = x^2 - \frac{1}{x}$  on the interval  $[2, 4]$

**□ Increasing/Decreasing:****Example:**

Given the function  $p(t)$  graphed here, on what intervals does the function appear to be increasing?



**□ Local Extrema:**

**Example:** Use a graph to estimate the local extrema of the function  $f(x) = \frac{2}{x} + \frac{x}{3}$ . Use these to determine the intervals on which the function is increasing.

**□ Concavity:****□ Composition of Function :**

**Example:** Let  $f(x) = x^2$  and  $g(x) = \frac{1}{x} - 2x$ , find  $f(g(x))$  and  $g(f(x))$ .

**□ Composition of Function :**

**Example:** Let  $f(x) = x^2$  and  $g(x) = \frac{1}{x} - 2x$ , find  $f(g(x))$  and  $g(f(x))$ .

To find  $f(g(x))$ , we start by evaluating the inside, writing out the formula for  $g(x)$

$$g(x) = \frac{1}{x} - 2x$$

**Inverse function**