Summary Notes on Functions

1. Definition of Functions

A function is a special relation where each input (x-value) corresponds to exactly one output (y-value). If an equation or graph assigns more than one y −value to a single x-value, it is not a function. One common way to check is the Vertical Line Test: *if a vertical line intersects a graph more than once, the relation is not a function.*

2. Functions and their Graphs

The graph of a function visually represents the relationship between inputs and outputs. Important aspects include:
- Domain: the set of possible x-values.
- Range: the set of resulting y-values.
- Intercepts: points where the graph crosses the x −axis or y-axis.
The shape of the graph depends on the type of function (linear, quadratic, cubic, etc.).

3. Function Notation

Functions are often written using function notation: $f(x)$. This means *the value of the function f at input x.* For example, if $f(x) = 2x + 3$, then $f(4) = 2(4) + 3 = 11$.
Function notation allows us to:
- Evaluate a function at specific values.
- Replace x with an expression, e.g., $f(x − 1)$.
- Represent real-world relationships in a precise mathematical form.