Basic Functions and Their Applications

⊛ Functions

Example :

$$y = 3x^2 + 2$$

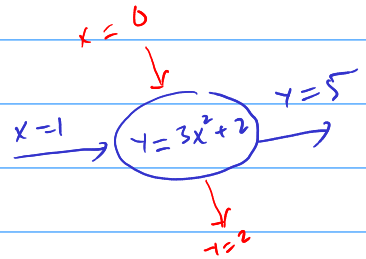
x : input

y : out put

y is a function of x

Input $x = 1 \Rightarrow$ output $y = 3 \cdot 1^2 + 2 = 3 + 2 = 5$

$y = 5$



⊛ Names of Functions

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

name of the function

argument / input

$$y = 3x + 2 = k(x)$$

⊛ Graphs of Functions

consider : $y = f(x) = 3x^2 + 2$

Let pick an input $x = 1$.

$\Rightarrow \quad y = 3 \cdot 1^2 + 2 = 5$

$(x, y) = (1, 5)$

Similarly we can create another pair from the function.

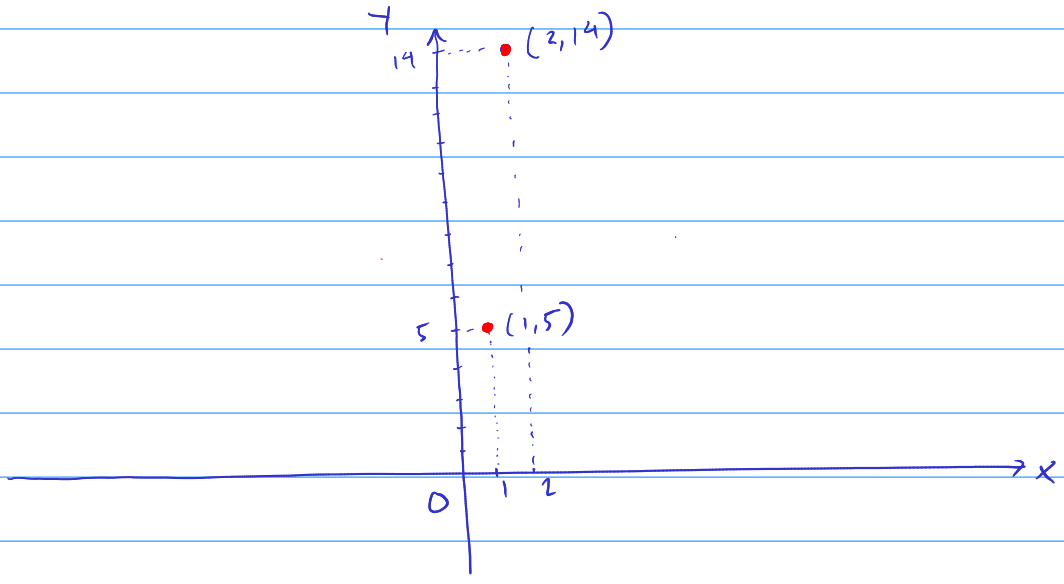
Say: $x = 2$, $y = 3x^2 + 2 = 3 \cdot 2^2 + 2$

$= 14$

$\Rightarrow$ we have

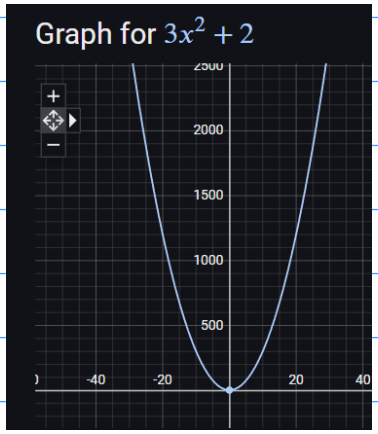
$(x, y) = (2, 14)$

we will present these 2 pairs on xy - coordinates



The graph of a function is the collection of ALL the points

generated by the function.



(*) Linear Functions

Defined by: $y = mx + b$

input

numbers | constants

Example:

$y = 3x + 2$

$y = \frac{1}{3} \cdot x + \frac{1}{2}$

m b

Example: which ones are linear functions and which ones are not.

(1) $y = -3x + \sqrt{3}$ (Linear)

(2) $y = 3x^2 + 1$ (non-linear b/c of x^2)

(3) $y = \frac{x}{3} + \sqrt{41} = \frac{1}{3} \cdot x + \sqrt{41}$

(Linear)

(5) $y = \frac{1}{3x+2}$ (not linear b/c x is in the denominator)

(6) $y = 4 - x = -1 \cdot x + 4$ (linear)

(7) $y = \sqrt{3x+2}$ (not linear b/c x is under the square root $\sqrt{\ }$)

(*) Graphs of linear function.

The graph of a linear function is a line.

Therefore, to graph a linear function we just need 2 points and connect them.

Example: Graph $y = 3x + 2$

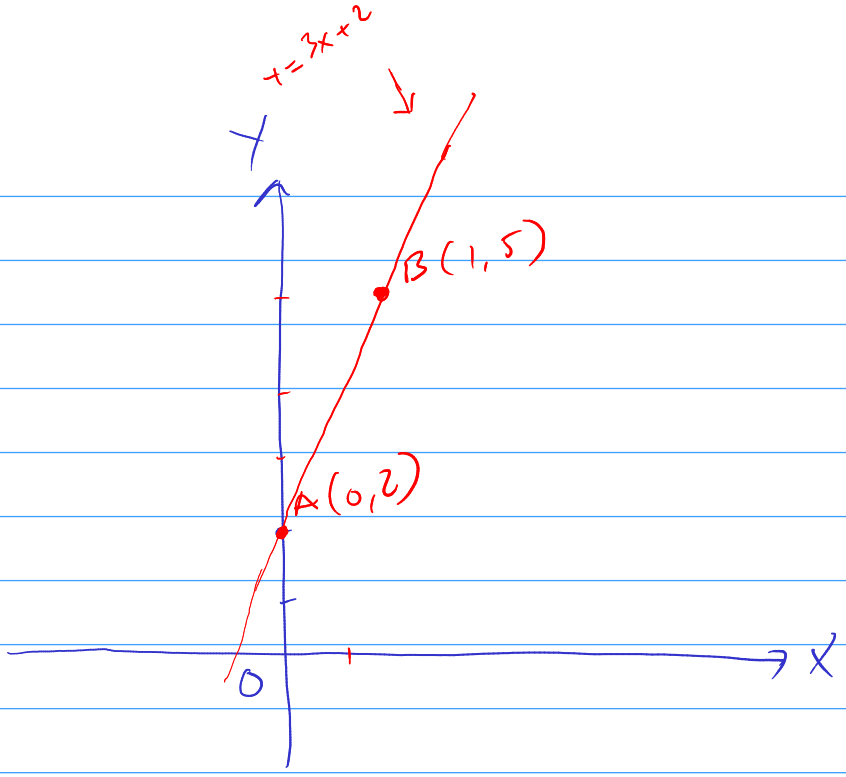
We just need 2 points

(*) $x = 0 \Rightarrow y = 3 \cdot 0 + 2 = 2$

point A : $(0, 2)$

(*) $x = 1 \Rightarrow y = 3 \cdot 1 + 2 = 5$

point B : $(1, 5)$



Assignment 1: Graph $y = 2x + 3$