⑦ Basic Functions and their Applications

Basic Functions

Functions

y (output) x (input)

$y = x$ (identity function)

$$y = 7x + 3$$

input $x = 1$ ⇒ output $y = 7 * 1 + 3 = 10$

$y = 10$

⑦

input → function → output

⑦ Names of functions

name of the function

$y = 3x + 2 = f(x)$ input of function

$y = 7x + 3 = k(x)$

name

(F) Some examples of functions

$$y = h(x) = 9x^2 + 2$$

$$y = s(x) = 3x - 1$$

$$y = t(x) = \sqrt{x^2 + 3}$$

$$y = m(x) = \frac{x+1}{x+2}$$

$$y = 10 \cdot x + \frac{1}{3}$$

$$y = \frac{1}{3} \cdot x - \sqrt{3}$$

linear function

(*) Linear Function

Define by: $y = f(x) = mx + b$

input variable

numbers | constants

Example: which ones are linear and which ones are non-linear?

① $y = 3x - 4^2$ (linear)

② $y = 3x^2 - 4$ (non-linear b/c of the x^2)

③ $y = \frac{3}{x} + 1$ (non-linear)

④ $y = 3x + 1$ (linear)

⑤ $y = \sqrt{3} \cdot x + \frac{1}{3}$ (linear)

⑥ $y = \frac{1}{3x + 1}$ (non-linear)

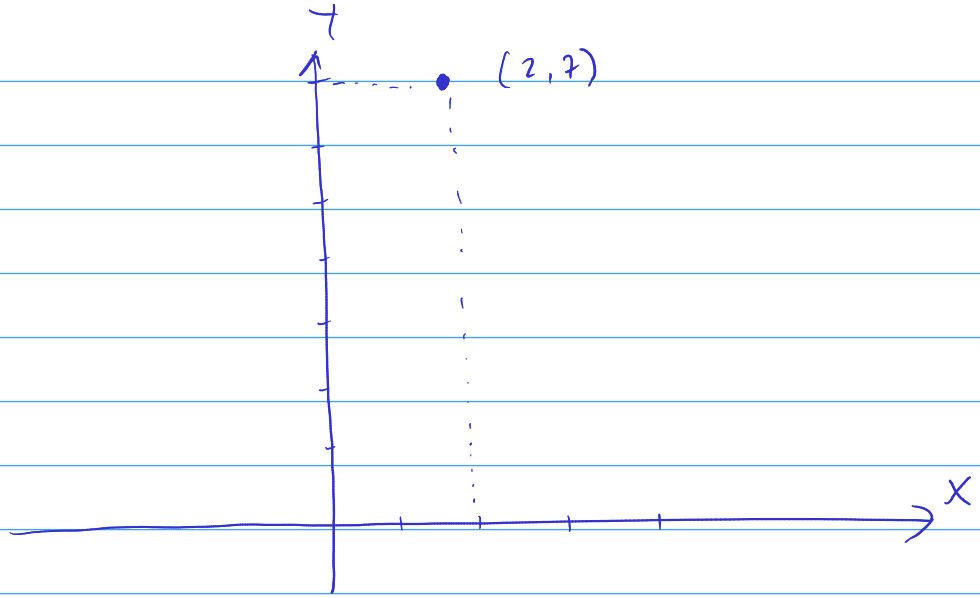
(*) Graphs of functions

$y = 2x^2 - 1$

input $x = 2$, $y = 2 \cdot 2^2 - 1 = 7$

$(x, y) = (2, 7)$

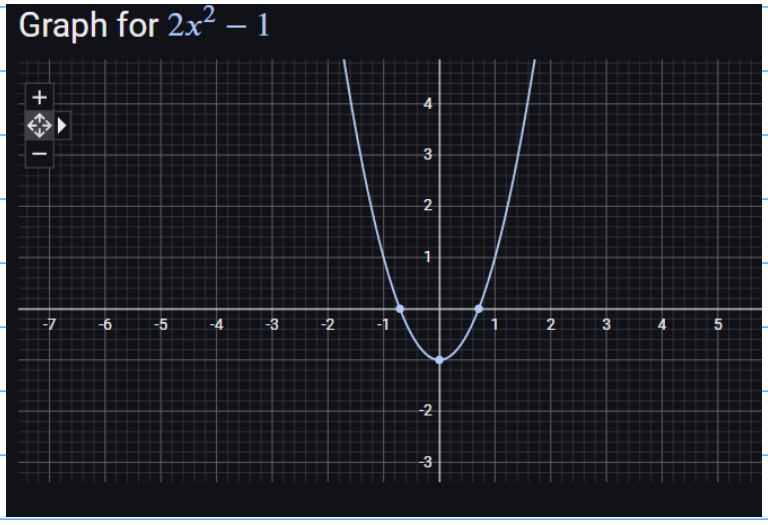
put this pair on the xy-coordinates



How many pairs (x, y) can we have from the function?

There are infinitely many pairs.

The graph of the function is the collection of ALL the pairs/points coming from the function.



* The graph of a linear function is a line.

Example

Graph $y = 3x + 1$

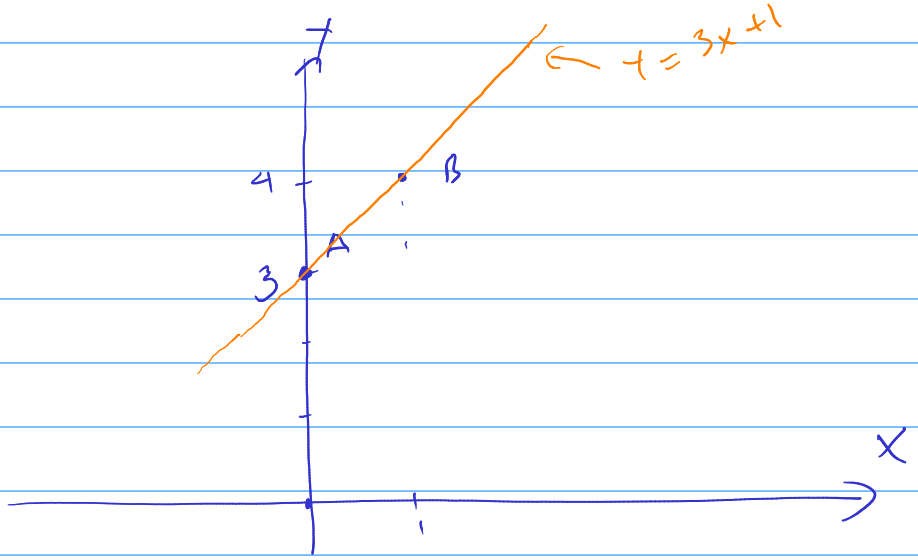
we just need 2 points to set the graph.

$x = 0 \Rightarrow y = 3 \cdot 0 + 1 = 3$

point A $(0, 3)$

$x = 1 \Rightarrow y = 3 \cdot 1 + 1 = 4$

point B $(1, 4)$



In - class Assignment 1:

Graph $y = 2x + 3$