

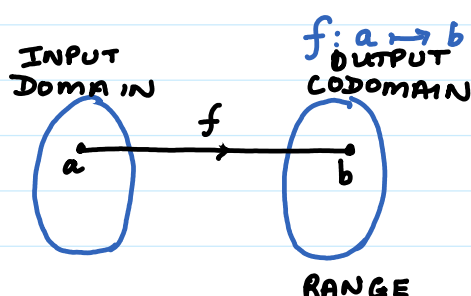
Function Definition. A relation from a set of inputs to a set of possible outputs, where each input is related to exactly one output.

math: A function from A to B is an assignment of exactly one element of B to each element of A

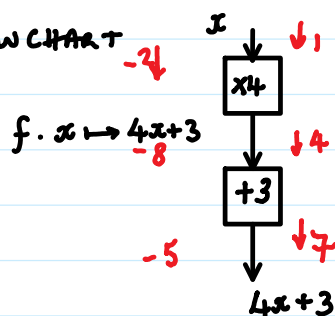
$$(b \in B)$$

$$(a \in A) \quad f(a) = b$$

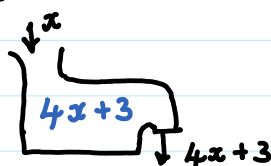
$f: a \mapsto b$ f maps a to b .



FLOW CHART



function machine



Which is the different function out of these four?

i) $f(y) = 6y - 3$

iii) $f(s) = 3(s-1) + 3s$

ii) $f(x) = 3(2x-1)$

iv) $f(p) = 6p - 2$

We use x a lot but it essentially a placeholder for the input so we could write

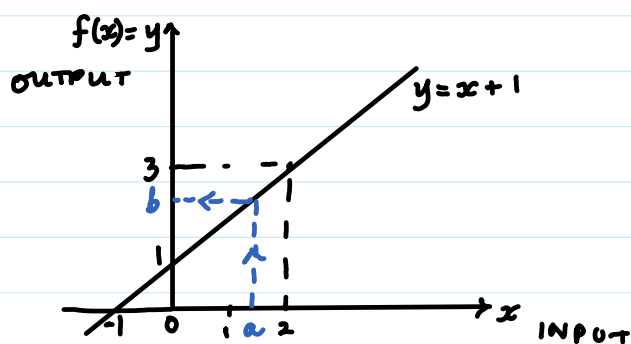
$$f(\circ) = 6(\circ) - 3$$

$$f(\square) = 6(\square) - 3$$

$$g(\square) = 6(\square) - 3$$

Graphs and Functions

We often use graphs to represent functions



x	$f(x)$
-1	0
0	1
2	3
a	b

$$f: x \mapsto x+1$$

linear function

COMPOSITE FUNCTIONS

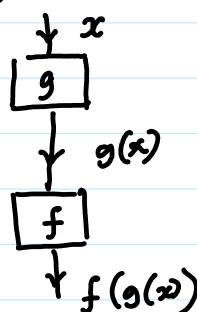
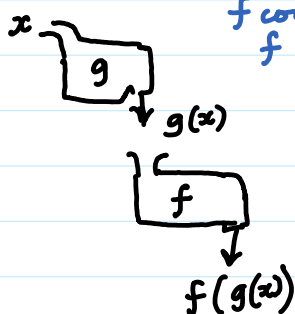
Composition

$$(f \circ g)(x) = f(g(x))$$

f composed with g
 f circle g
 f of g

$$= fg(x)$$

'function of a function'



Example Let $f(x) = x^2$ and $g(x) = x+1$ find

a) $fg(1)$

b) $gf(2)$

c) $fg(x)$

d) $gf(x)$

a) $\rightarrow 1 \rightarrow 2 \rightarrow 2^2$

b) $\rightarrow 2 \rightarrow 4 \rightarrow 5$

c) $\rightarrow x \rightarrow (x+1) \rightarrow (x+1)^2$

d) $\rightarrow x \rightarrow x^2 \rightarrow x^2+1$

NOTICE $fg(x) \neq gf(x)$ [only occasionally!]

