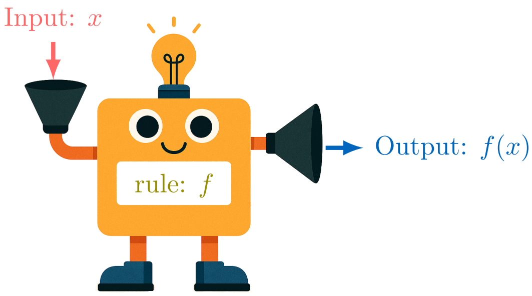
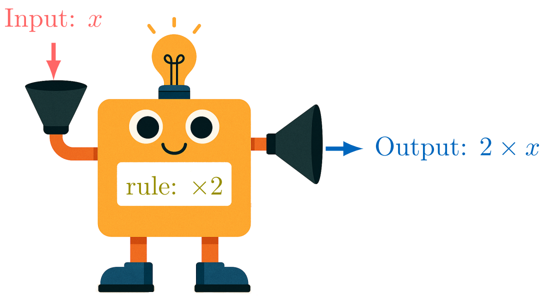
FUNCTIONS

A DEFINITIONS

Discover: A function is like a machine that produces an output from an input according to a rule.



To represent this machine, we write $f(\text{input}) = \text{output}$. The brackets ( ) indicate the action of the function f on the input. We use function notation to name functions and their variables, replacing "input" by "x" and "output" by "$f(x)$".
For example, if the rule is "twice the input":



we have $f(x) = 2 \times x$.
When the input is $x = 1$, we get:

$$\begin{aligned} f(1) &= 2 \times (1) \\ &= 2 \end{aligned}$$

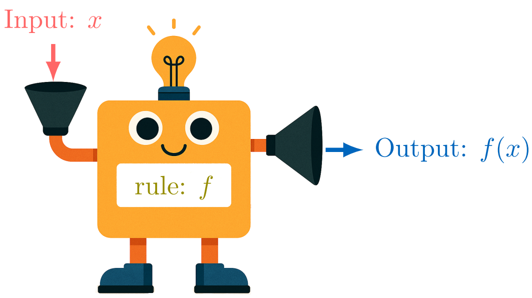
The table of values below shows the output values for different input values:

Input: x	0	1	2
Output: $f(x)$	0	2	4

Twice the input

Definition Function

From an input value x, a **function** f produces an output value $f(x)$.
$f(x)$ is read as "f of x".



Ex: For $f(x) = 2x - 1$ (the function that doubles the input and subtracts 1), find $f(5)$.

Answer: $\begin{aligned} f(5) &= 2 \times (5) - 1 \quad \text{(substituting } x \text{ by (5))} \\ &= 9 \end{aligned}$

B TABLES OF VALUES

Definition Table of Values

The **table of values** for a function f provides a listing of pairs $(x, f(x))$, where x is an input value and $f(x)$ is the corresponding output value produced by the function f.

Ex: For $f(x) = x^2$, complete the following table:

x	-2	-1	0	1	2
$f(x)$					

Answer:

- $f(-2) = (-2)^2$ (substituting x by (-2))
  $= 4$
- $f(-1) = (-1)^2$ (substituting x by (-1))
  $= 1$
- $f(0) = (0)^2$ (substituting x by (0))
  $= 0$
- $f(1) = (1)^2$ (substituting x by (1))
  $= 1$
- $f(2) = (2)^2$ (substituting x by (2))
  $= 4$

So the completed table is:

x	-2	-1	0	1	2
$f(x)$	4	1	0	1	4