

I. Domain – Range

A **function maps** (connects) each element in a given set (the **domain**) onto just one element (or **image**) in another set (the **range**).

The domain of a function is the set of **input values** for which the function is defined.

If a function is fully defined, the domain is the complete set \mathbb{R} of real numbers.

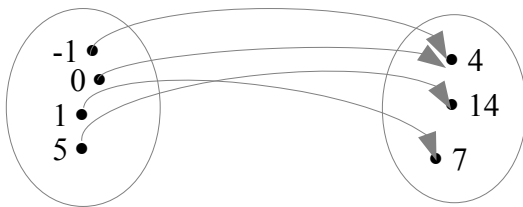
Once the domain is defined, there is a corresponding set of **output values**, called the range (or the **image-set**) of the function (values taken on by the function).

The **notation** $y = f(x)$ means :

« the number y is the output corresponding to the input number x , according to the function f »

II. Representations of a function

A function can be represented by a **mapping diagram**, where an arrow links each input to its output :



Remember that each input is limited to a single output, but a number in the range may correspond to several numbers in the domain.

Note : a function is also called a mapping, or simply a map.

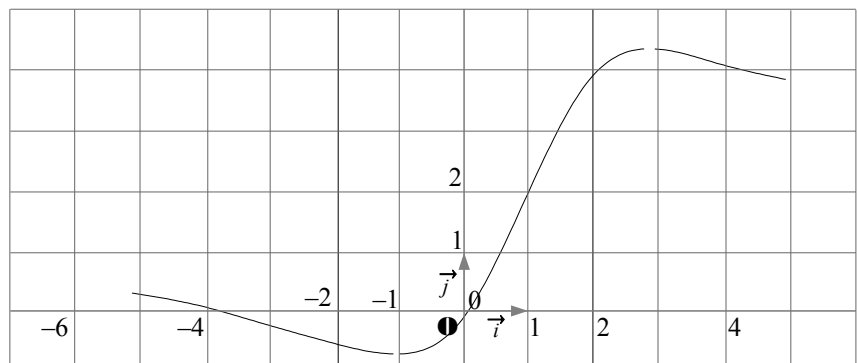
A function can be represented by a set of **ordered pairs**, where an ordered pair is constituted of an input (written at the first position), and its output value (written at the second position) :

$$f = \{(-1;4), (0;4), (1;7), (5;14)\}$$

These first two representations are practical when the domain is finite.

A function can be represented by a **graph**, especially with infinite domains.

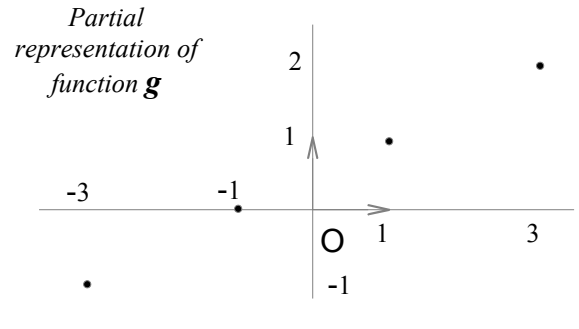
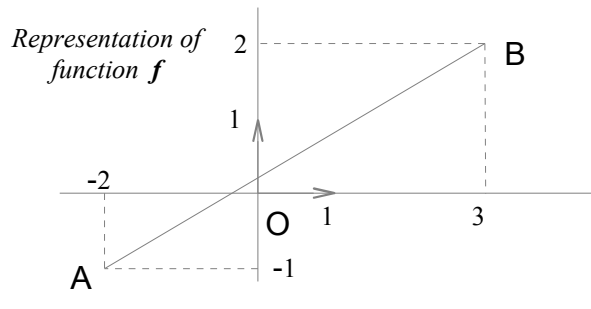
Some ordered pairs are plotted, and lines or curves join the points, thus providing an approximation of the output for an input number not precisely described by one of the couples.



Exercise 1:

Vocabulary diagram – domain – function – graph – image – image-set – input value – to map – notation – ordered pair – output value – range

Give the domain and the range of function f represented by the line segment $[AB]$, and function g represented by points :



III. Even and Odd functions

A function is said to be **even** if :

- its domain \mathcal{D} is **symmetrical about** the number 0,
- $f(-x) = f(x)$ for all values of x of \mathcal{D} .

The graph of an even function is symmetrical about _____ .

A function is said to be **odd** if :

- its domain \mathcal{D} is symmetrical about _____ ,
- _____ for all values of x of \mathcal{D} .

The graph of an odd function is _____ : the origin O divides the graph into two sections, each of which can be **rotated about O through** an angle π to give the other section.

Exercise 2: Give the domain \mathcal{D} of the functions and state which are even or odd.
What about their graph ?

a) $f(x) = \frac{x}{x^2 - 9}$

b) $f(x) = \sqrt{4 - x^2}$

IV. Linear functions

A function f of the form $f(x) = ax + b$, where a and b are constant, is called a linear function.

The graph of a linear function is a _____ with equation _____ .

Exercise 3:

Find the linear function f with $f(5) = 2$ and $f(0) = 4$.

Exercise 4:

The temperature of some water was 25°C when it was put into a refrigerator and then **fell by 3°C** every 5 mn for the next 30 mn.

Express the temperature T as a function of the time t . Is it a linear function?

What is the temperature after 15 mn ?

Vocabulary even – to fall by ... – linear – to rotate about (a point) through (an angle) – symmetrical about ... – odd