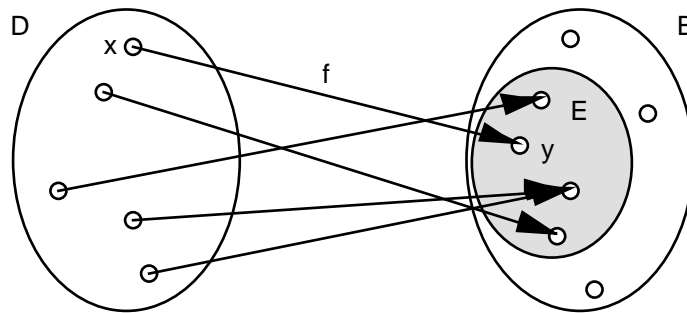# Function

Definition and examples

Def.:   A **function** f is a rule that assigns to **each** element x in a set D **exactly one** element y in a set B.
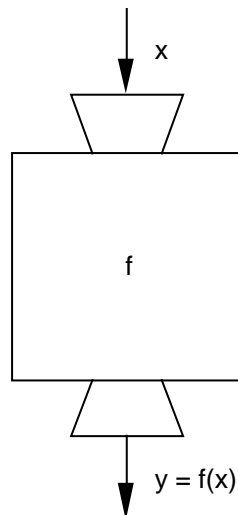

The function f **maps** the set D onto the set B.

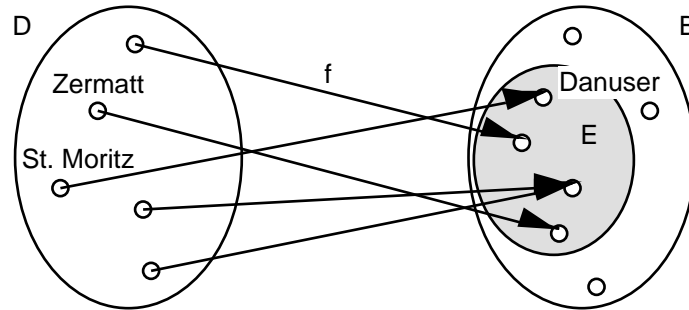f: D   B
      x   y = f(x)   ("f of x")

The set D is the **domain**, the set B is the **codomain**, and the set E is the **range** of the function f.

The element y is the **image** of the element x.
or (if D and B are number sets): y is the **value** of f at x.

Ex.:   1.   D = set of all the Swiss holiday resorts
              B = set of all the human beings

              f: D   B
                        r   d = f(r) = director of holiday resort r

        2.   D = set of all the countries of the world
              B = set of all the cities of the world

              f: D   B
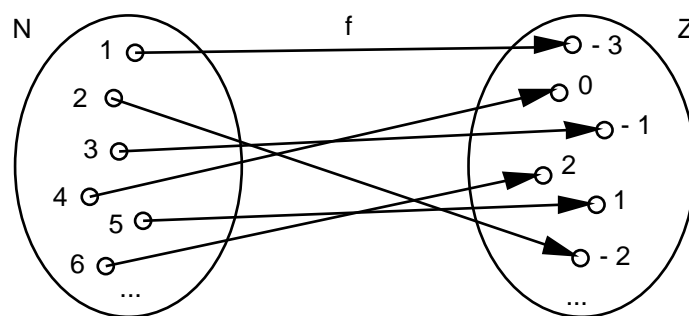   a   b = f(a) = capital of country a

        3.   Cable car company

              D = $\mathbb{N}$ (= set of natural numbers)
              B = $\mathbb{R}$ (= set of real numbers)

              f: D   B
                        n   p = f(v) = profit (e.g. in Euros) when n tickets have been sold

        4.   D = $\mathbb{N}$
              B = $\mathbb{Z}$

              f: $\mathbb{N}$ $\mathbb{Z}$
                        n   y = f(n) = n - 4

        5.   D = B = $\mathbb{R}$

              p: $\mathbb{R}$ $\mathbb{R}$
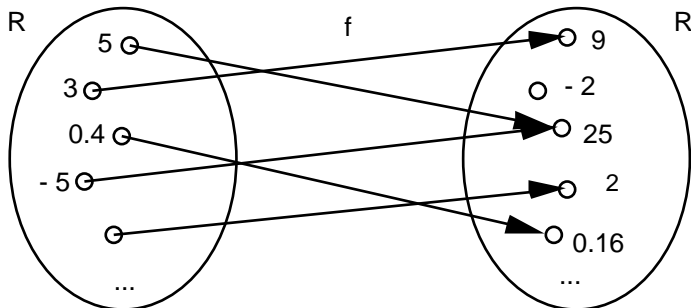   x $y = p(x) = \dfrac{x^3-3}{2x^2+1}$

Representation of a function

Arrow diagram

Table of values

x	y
1	1
3	9
5	25
- 5	25
0.4	0.16
...	...

Formula

f: $\mathbb{R}$ $\mathbb{R}$
       x $y = f(x) = x^2$

Graph

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