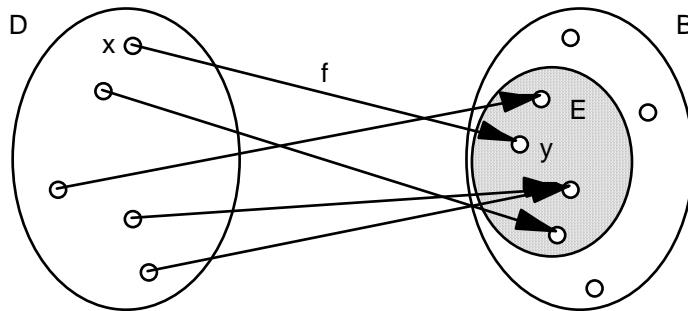


Function

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 .

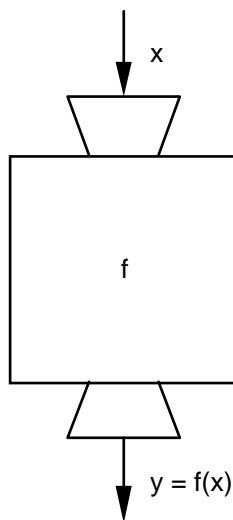


The function f **maps** the set D onto the set B .

$$f: D \rightarrow B$$
$$x \rightarrow y = f(x) \quad (\text{"f of x"})$$

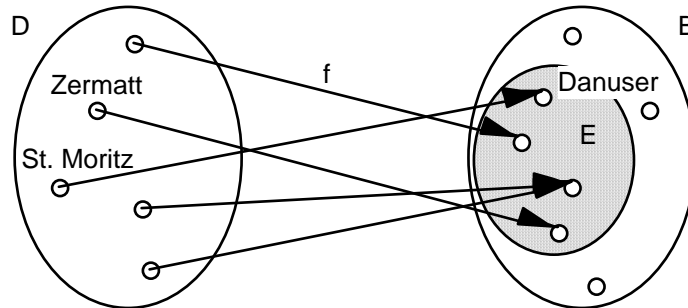
The set D is the **domain**, the set B is the **codomain**, and the set E is the **range** of the function f .

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: $D \rightarrow B$
 $r \rightarrow d = f(r) = \text{director of holiday resort } r$



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

f: $D \rightarrow B$
 $a \rightarrow b = f(a) = \text{capital of country } a$

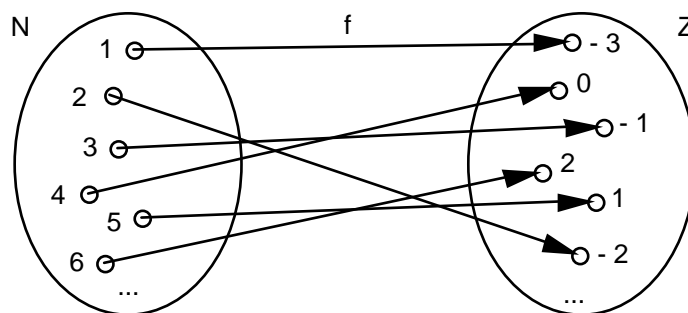
3. Cable car company

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

f: $D \rightarrow B$
 $n \rightarrow r = f(n) = \text{revenue (e.g. in Euros) when } n \text{ tickets are sold}$

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

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



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

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

Representation of a function

Arrow diagram

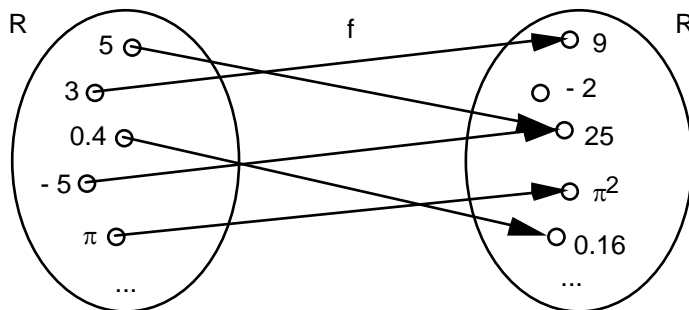


Table of values

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

Equation

$$f: \mathbb{R} \rightarrow \mathbb{R}$$

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

Graph

