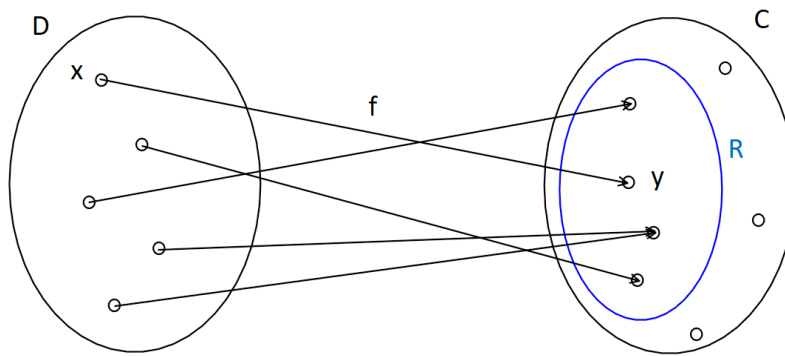


Function

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 C .

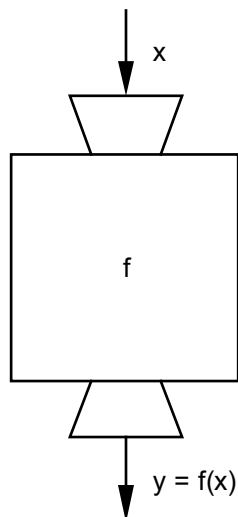


The function f **maps** the set D onto the set C .

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

The set D is the **domain**, the set C is the **codomain**, and the set R is the **range** of the function f .

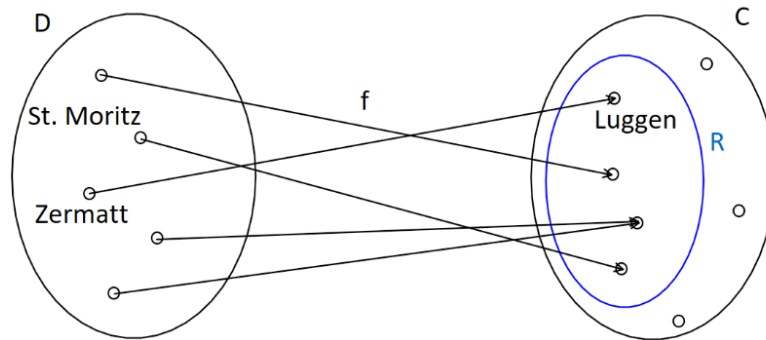
The element y is the **image** of the element x .
or (if D and C are number sets): y is the **value** of f at the position x .



- Ex.: 1. $D = \text{set of all Swiss holiday resorts}$
 $C = \text{set of all human beings}$

$$f: D \rightarrow C$$

$$r \mapsto h = f(r) = \text{director of holiday resort } r$$



2. $D = \text{set of all countries of the world}$
 $C = \text{set of all towns and cities of the world}$

$$f: D \rightarrow C$$

$$c \mapsto t = f(c) = \text{capital of country } c$$

3. Cable car company

$$D = \mathbb{N} \quad (= \text{set of natural numbers})$$

$$C = \mathbb{R} \quad (= \text{set of real numbers})$$

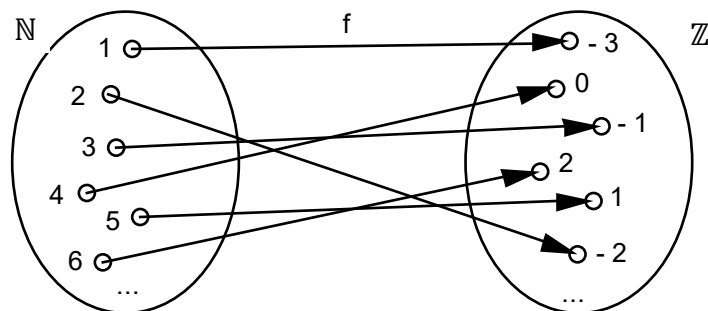
$$f: \mathbb{N} \rightarrow \mathbb{R}$$

$$n \mapsto r = f(n) = \text{revenue (in CHF) when } n \text{ tickets are sold}$$

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

$$f: \mathbb{N} \rightarrow \mathbb{Z}$$

$$n \mapsto y = f(n) = n - 4$$



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

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

$$x \mapsto y = p(x) = \frac{x^3 - 3}{2x^2 + 1}$$

Representation of a function

Ex.: $f: \mathbb{R} \rightarrow \mathbb{R}$
 $x \mapsto y = f(x) = x^2$

Arrow diagram

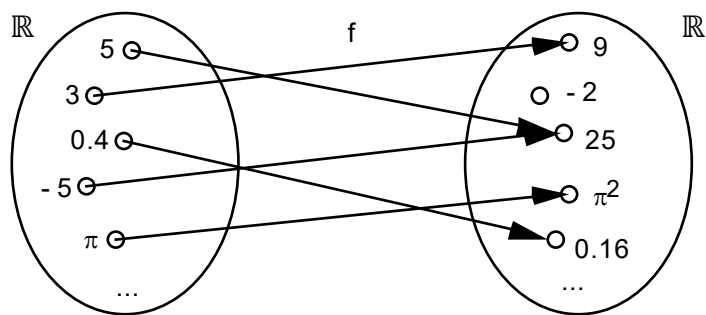


Table (Table of values)

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

Graph

