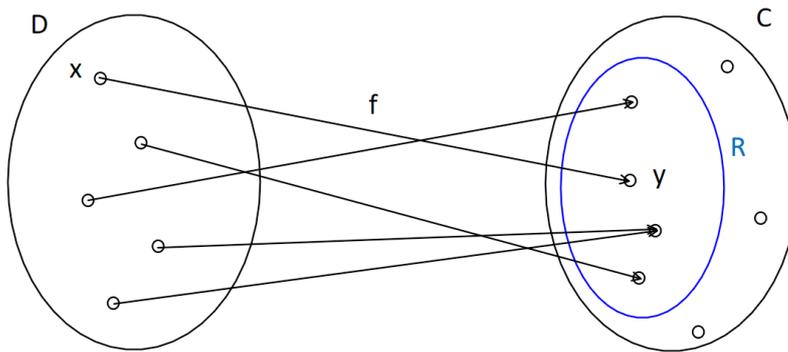


Function

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 .

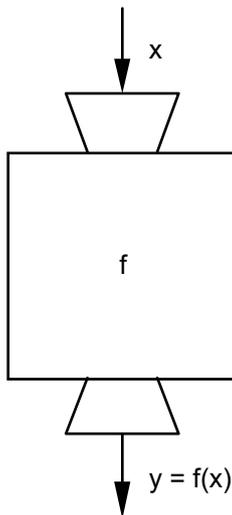


The function f **maps** the set D onto the set C .

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

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

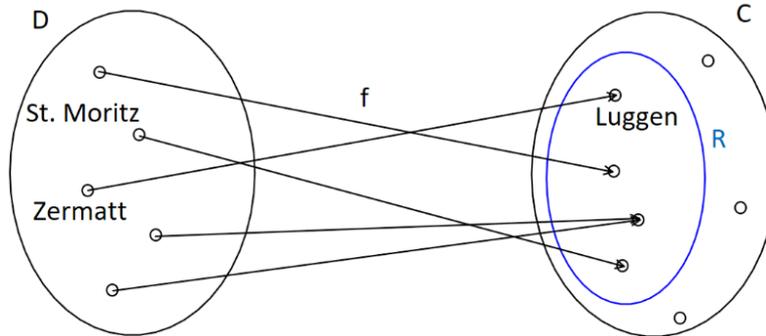
The element y is the **image** of the element x .
or (if D and C are number sets): y is the **value** of f at x .



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

$$f: D \rightarrow C$$

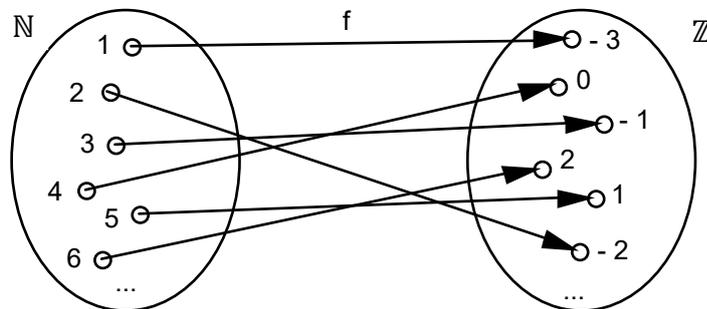
$$r \mapsto d = f(r) = \text{director of holiday resort } r$$



2. $D =$ set of all countries of the world
 $C =$ set of all cities of the world
- $$f: D \rightarrow C$$
- $$a \mapsto b = f(a) = \text{capital of country } a$$

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

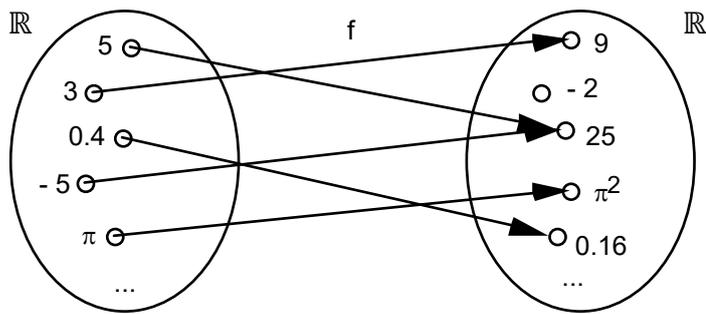


Table (Table of values)

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

Graph

