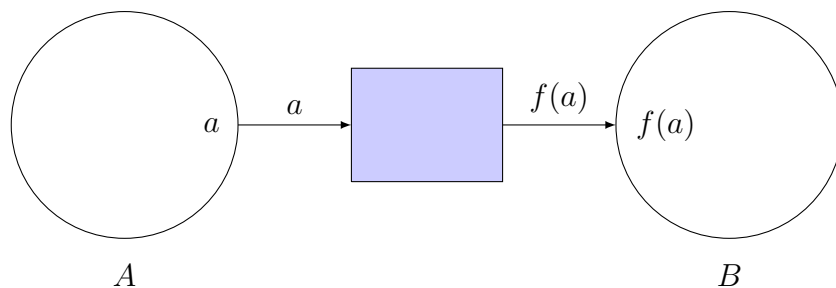


Functions: Mapping from Sets to Sets

Video companion

1 Function as a machine



A function $f : A \rightarrow B$ is a rule/formula/machine that transforms each element $a \in A$ into $f(a) \in B$.

a : input

$f(a)$: output

2 Examples

Abstract example:

$$A = \{1, 2, 10\} \quad B = \{\text{apple}, \text{DE}, \text{monkey}\}$$

$$f : A \rightarrow B$$

$$f(1) = \text{apple}$$

$$f(2) = \text{apple}$$

$$f(10) = \text{monkey}$$

Study participants test positive or negative:

$$\begin{aligned} X &= \{\text{all people in VBS study}\} & Y &= \{+, -\} \\ \text{Test} : X &\rightarrow Y \\ \text{Test}(\text{person}) &= + \\ \text{Test}(\text{person}) &= - \end{aligned}$$

Profit by year:

$$\begin{aligned} Y &= \{\dots 2010, 2011, 2012, \dots\} & \mathbb{R} \\ \text{Profit} : Y &\rightarrow \mathbb{R} \\ \text{Profit}(\text{year}) &= \text{profit/loss in year} \\ \text{Profit}(2011) &= 1,007 \\ \text{Profit}(2012) &= -10,000 \end{aligned}$$

3 Supervised learning

Given: some examples of inputs $a \in A$ and outputs $f(a) \in B$

Mission: figure out $f : A \rightarrow B$