The Bright Side of Mathematics

Start Learning Sets – Part 4

Cartesian product: $A \times B$ set of all ordered pairs

$A := \{\Delta, \square, \bigcirc\}$

$B := \{4, 7\}$

$\rightsquigarrow (\Delta, 7)$

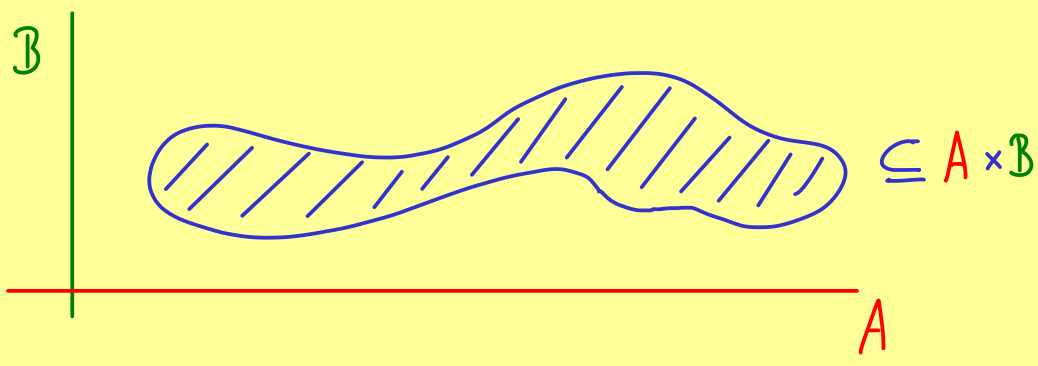
7	$(\Delta,7)$	$(\square,7)$	$(\bigcirc,7)$
4	$(\Delta,4)$	$(\square,4)$	$(\bigcirc,4)$
	Δ	$\square$	$\bigcirc$

Definition of ordered pair: For elements x, y write $(x,y) := \{\{x\}, \{x,y\}\}$

$$(x,y) = (\tilde{x},\tilde{y}) \iff \{x\} = \{\tilde{x}\} \wedge \{x,y\} = \{\tilde{x},\tilde{y}\}$$

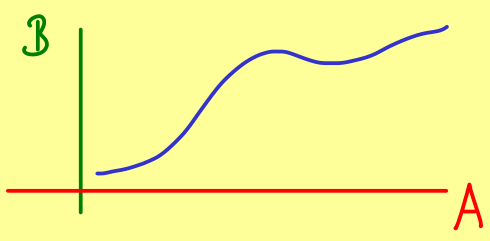
$$\iff x = \tilde{x} \wedge y = \tilde{y}$$

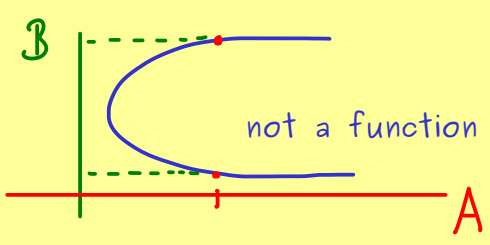
Definition: $A \times B := \{(a,b) \mid a \in A \wedge b \in B\}$



A subset $G_f \subseteq A \times B$ is called a function if

$(\forall x \, \forall y \, \forall \tilde{y} : (x,y) \in G_f \wedge (x,\tilde{y}) \in G_f \longrightarrow y = \tilde{y})$ is true.



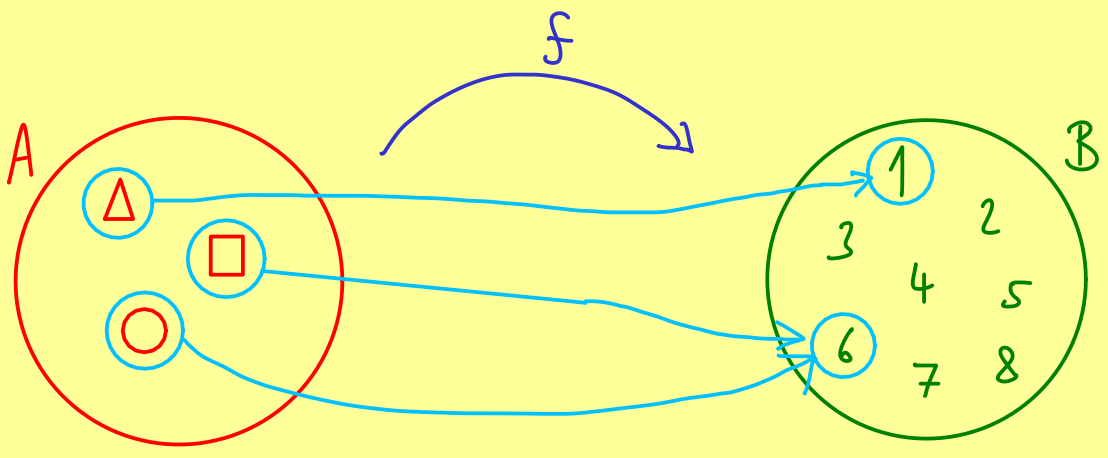


If also $\forall x \in A : \exists y \in B : (x,y) \in G_f$ is true,

we write: $f : A \to B$ and $f(x) = y$ for $(x,y) \in G_f$

a map from A into B — domain of f — codomain of f — graph of f

Example:



$f(\Delta) = 1$

$f(\bigcirc) = 6$

$f(\square) = 6$