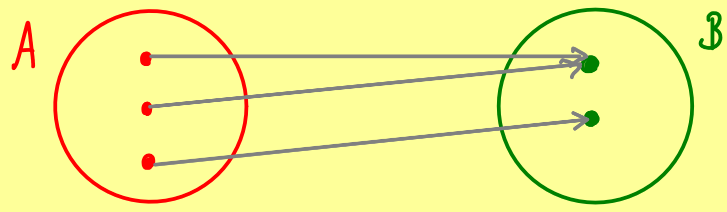
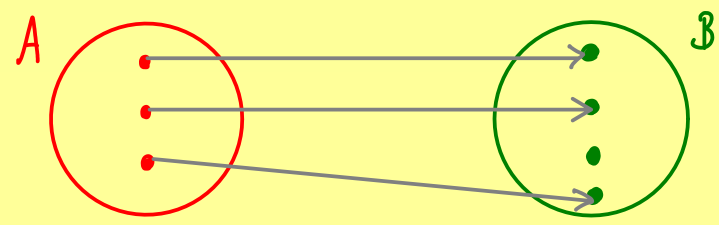
The Bright Side of
Mathematics

Start Learning Sets – Part 6



not injective



not surjective

Definition: A map $f: A \to B$ is called:

injective if $\forall x_1, x_2 \in A : \left(x_1 \neq x_2 \to f(x_1) \neq f(x_2) \right)$ is true

surjective if $\forall y \in B : \exists x \in A : f(x) = y$ is true

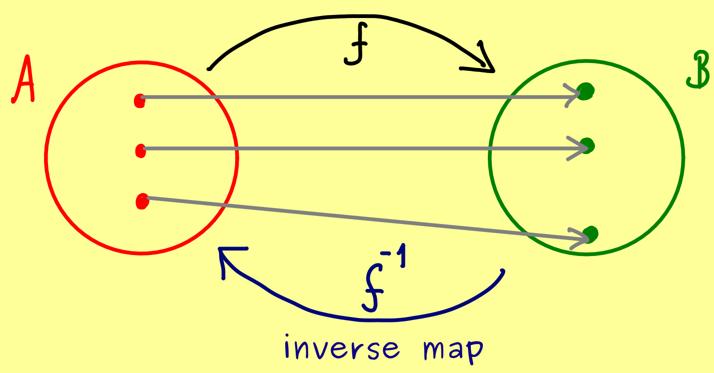
Remember:

surjective: Each $y \in B$ gets at least one arrow.

injective: Each $y \in B$ gets at most one arrow.

$\underbrace{\text{injective + surjective}}_{\text{bijective (1:1)}}$ Each $y \in B$ gets exactly one arrow.

bijective (1:1)
$\Updownarrow$
invertible



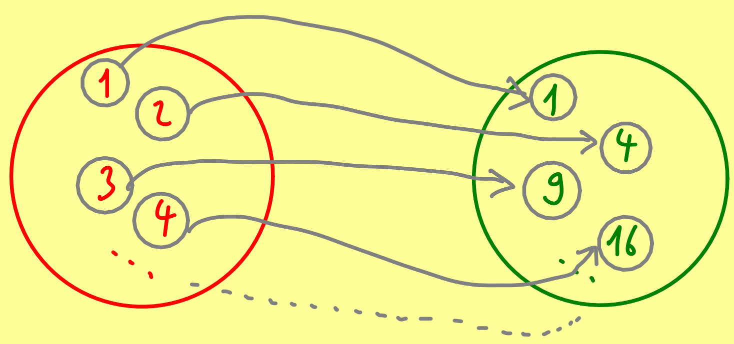
bijective

$f^{-1}: B \to A,$

$f^{-1}(y) := x$ if $f(x) = y$

Example: $f: \mathbb{N} \to \{1, 4, 9, 16, 25, 36, \ldots\}$

$x \mapsto x^2$



$f^{-1}: \{1, 4, 9, 16, 25, 36, \ldots\} \to \mathbb{N}$

$y \mapsto \sqrt{y}$