

Cartesian Products

Cartesian Products

Definition

Definition: The Cartesian Product $A \times B$ of two sets A and B is the set of ordered pairs (a, b) where $a \in A$ and $b \in B$.

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

Example

$A = \{1, 2, 3\}$ and $B = \{x, y\}$. What is $A \times B$?

Example

$$\mathbb{R} \times \mathbb{R} = \{(a, b) : a \in \mathbb{R}, b \in \mathbb{R}\}$$

Example

What is $\mathbb{N} \times \{-1, 1\}$?

Example

$$\mathbb{Z} \times \mathbb{Z}$$

Example

$$\mathbb{N} \times (\mathbb{N} \times \mathbb{N}) \text{ vs } \mathbb{N} \times \mathbb{N} \times \mathbb{N}$$

Cartesian Powers

$A = \{H, T\}$. What is A^4 ? What is $|A^4|$?