Subsets

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Definition

Suppose that A and B are sets.

- If every element of A is also an element of B, then we say that A is a subset of B. This can be written using the subset symbol A⊆B.
- If at least one element of A is not an element of B, then A is not a subset of B. This can be written A ⊈ B.

If
$$A = \{-3, 15, purple\}$$

 $B = \{-3, 15, purple, elephant\}$
then $A \leq B$
 $C = \{-3, 14, purple\}$
 $C \notin B$ because 14 eC but 14 $\notin B$

►
$$\{2,3,7\} \subseteq \{2,3,4,5,6,7\}$$

 A B
 A is n B

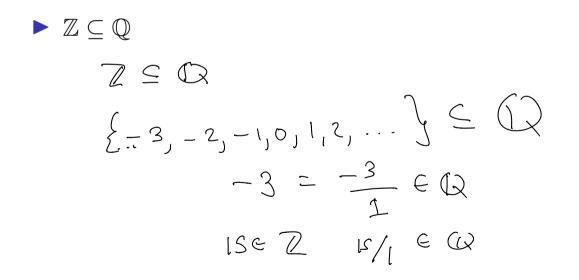
A B

$$\{2,3,11\} \not\subseteq \{2,3,4,5,6,7\}$$

 $II \in A$ but $II \notin B$
one element of A is NOT in B

$$\mathbb{N} \subseteq \mathbb{Z}$$

$$\mathbb{N} \in \{1, 2, 3, \dots, j\} \subseteq \mathbb{Z} \in \{2, \dots, -3, -2, -1, 0, 1, \dots, j\}$$



$$\mathbb{R} \times \mathbb{N} \subseteq \mathbb{R} \times \mathbb{R}$$

$$\mathbb{R} \times \mathbb{N} = \begin{cases} (r_{3}n) : r \in \mathbb{R}, n \in \mathbb{N} \\ \text{typical element might be } (T, 4) \in \mathbb{R} \times \mathbb{N} \\ \text{typical element might be } (T, 4) \in \mathbb{R} \times \mathbb{N} \\ \mathbb{R} \times \mathbb{R} = \begin{cases} (r_{1}, r_{2}) : r_{1} \in \mathbb{R} \text{ and } r_{2} \in \mathbb{R} \\ \text{for a real number} \\ \text{since } \mathbb{N} \leq \mathbb{R} \\ \text{is also } n \\ \text{is also } \mathbb{N} \\ \text{K} \times \mathbb{R} \end{cases}$$

$$So \quad \mathbb{R} \times \mathbb{R} \times \mathbb{R}$$

For any set A, $A \subseteq A$. For any A is a subset of itself set A) Because every element of A is an element of A.

The Empty Set