

Mathematical Notations

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Set Theory

1 Set is denoted by $\{ \}$. Set with 2 and 3 is denoted by $\{2, 3\}$.

Let A be a set of n elements. Then $A = \{1, 2, \dots, n\}$.

Then assert a is present in A is denoted by $a \in A$. And assert b is not present in A is denoted by $b \notin A$.

Some Predefined Sets:

1.1 Natural numbers is denoted by \mathbb{N} .

$$\mathbb{N} = \{1, 2, 3, \dots\}.$$

1.2 Integers is denoted by \mathbb{Z} .

$$\mathbb{Z} = \{\dots, -3, -2, -1, 0, 1, 2, 3, \dots\}.$$

1.3 Rational number is denoted by \mathbb{Q} .

$$\mathbb{Q} = \left\{ \frac{p}{q} : p, q \in \mathbb{Z}, q \neq 0 \right\}.$$

For example:

$$\frac{1}{3} \in \mathbb{Q}, \frac{-1}{34} \in \mathbb{Q}, \sqrt{2} \notin \mathbb{Q}, \pi \notin \mathbb{Q}.$$

1.4 Real number is denoted by \mathbb{R} .

$$\mathbb{R} = \{x | -\infty < x < \infty\}.$$

eg. $-67.343 \in \mathbb{R}$.

1.5 Complex number is denoted by \mathbb{C} .

$$\text{i.e } \mathbb{C} = \{z | z = a + bi, -\infty < a < \infty, -\infty < b < \infty\};$$

If set A is a subset of B , then we write $A \subseteq B$.

this means $\mathbb{N} \subseteq \mathbb{Z} \subseteq \mathbb{Q}$.

If set A is a proper subset of B , then we write $A \subset B$.

Suchthat | Symbol .

$$A = \{x | x \subseteq \mathbb{R}, x < 0\}.$$

Intersection \cap : object that belong to set A **and** set B .

Union \cup : object that belong to set A **or** set B .

If set A is **not** a subset of B , then we write $A \not\subseteq B$.

Power Set : All subsets of A .

Represented by 2^A or $P(A)$ or $\mathbb{P}(A)$.

Equality = Symbol.

$A = B$ if and only if $A \subseteq B$ and $B \subseteq A$.

when both set have same elements, then they are equal.

Complement A^c or A' : Set of all elements that are not in set A .

Relative complement $A \setminus B$ or $A - B$: object that belong to A but not to B .

Symmetric difference $A \Delta B$ or $A \oplus B$: object that belong to A or B but not to their intersection.

Orderedpair (a, b) : collection of two elements.

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

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

Cardinality $|A|$ or $\#A$: number of elements in set A .

\aleph_0 : infinite cardinality of natural numbers set.

\aleph_1 : cardinality of countabel ordinal numbers set.

\emptyset : empty set. $\emptyset = \{\}$.

\mathbb{U} : Universal set. Set of all possible set.