Mathematical Notations

Kunal Singh

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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 $A = \{1, 2, \ldots, n\}$.

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

1.2 Integers is denoted by $\mathbb{Z}$.
$\mathbb{Z} = \{\ldots, -3, -2, -1, 0, 1, 2, 3, \ldots\}$.

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 Compex number is denoted by $\mathbb{C}$.
i.e $\mathbb{C} = \{z \mid z = a + bi,\ -\infty < a < \infty,\ -\infty < b < \infty\}$;

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

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 $A \not\subset B$.

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 $A \backslash B$ or $A - B$: object that belong to A but not to B.

Symmetric difference $A \Delta B$ or $A \Theta B$: 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.
$A \times B = \{(a, b) \mid a \in A, b \in B\}$.

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.