Look at the following sets of numbers :

$$A = \{x \in \mathbb{R} \mid 2 < x < 5\}$$

$$B = \{x \in \mathbb{R} \mid 2 \leq x \leq 5\}$$

$$C = \{x \in \mathbb{R} \mid 2 < x \leq 5\}$$

$$D = \{x \in \mathbb{R} \mid 2 \leq x < 5\}$$

Note that the four sets contain only the points between 2 and 5 with the possible exceptions of 2 and/or 5. These sets are called intervals and the numbers 2 and 5 are the endpoints of each interval.

As intervals appear very often in mathematics, it is common to use a shorthand notation to describe intervals. For example, the pervious intervals are denoted as :

A = (2, 5) =]2, 5[

B = [2, 5]

C = (2,5] =]2, 5]

D = [2,5) = [2, 5[

Properties of the intervals

Let R be the family of all intervals of the real line. Include in R are: the empty set ∅ and the points a = [a,a]. intervals, then, have the following properties :

1. The intersection of two intervals is an interval; that is, $A, B \in \mathbb{R} \Rightarrow A \cap B \in \mathbb{R}$.
2. The union of two no disjoint intervals is an interval; that is, $A, B \in \mathbb{R}$ and $A \cap B \neq \emptyset \Rightarrow A \cup B \in \mathbb{R}$.
3. The difference of two non comparable intervals is an interval; this is $A, B \in \mathbb{R}$ and A, B not comparables $\Rightarrow A - B \in \mathbb{R}$.

Infinite intervals

The sets of them from

$$A = \{x \mid x > 1\}$$

$$B = \{x \mid x \leq 0\}$$

$$C = \{x \mid x \in \mathbb{R}\}$$

Are called infinite intervals and they are also denoted as

$$A = (1, \infty)$$

$$B = (-\infty, 0)$$

$$C = (-\infty, \infty)$$