

## Set operations

**1) Union:**

The *union* of two sets  $A$  and  $B$ , denoted by  $A \cup B$ , is the set of all elements which belong to  $A$  or to  $B$ ;

$$A \cup B = \{x : x \in A \text{ or } x \in B\}$$

**Example:**

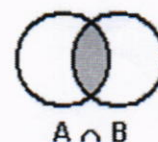
$$A = \{1, 2, 3, 4, 5\} \quad B = \{5, 7, 9, 11, 13\}$$

$$A \cup B = \{1, 2, 3, 4, 5, 7, 9, 11, 13\}$$

**2) Intersection:**

The *intersection* of two sets  $A$  and  $B$ , denoted by  $A \cap B$ , is the set of elements which belong to both  $A$  and  $B$ ;

$$A \cap B = \{x : x \in A \text{ and } x \in B\}$$

**Example 1:**

$$A = \{1, 3, 5, 7, 9\} \quad B = \{2, 3, 4, 5, 6\}$$

The elements they have in common are 3 and 5

$$A \cap B = \{3, 5\}$$

**Example 2:**

$$A = \{\text{The English alphabet}\} \quad B = \{\text{vowels}\}$$

$$\text{So } A \cap B = \{\text{vowels}\}$$

**Example 3:**

$$A = \{1, 2, 3, 4, 5\} \quad B = \{6, 7, 8, 9, 10\}$$

In this case  $A$  and  $B$  have nothing in common.  $A \cap B = \emptyset$

**3) The Difference:**

The difference of two sets  $A \setminus B$  or  $A - B$  is those elements which belong to  $A$  but which do not belong to  $B$ .

$$A \setminus B = \{x : x \in A, x \notin B\}$$

