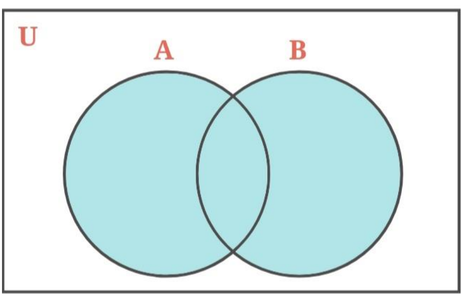
Union of sets

Given two sets A and B, the union of A and B it is

$$A \cup B = \{x \in U \mid x \in A \; or \; x \in B\}$$



The union of A and B, is the sets of elements x of U such that x belongs to A, or x belongs to B.

The union operation is associative, commutative and has an identity elements :

1. Commutative: $A \cup B = B \cup A$
2. Associative: $(A \cup B) \cup C = A \cup (B \cup C)$
3. Identity element: $A \cup \emptyset = \emptyset \cup A = A$

The union of two sets introduced above can be extended to multiple sets. Thus, the union of a finite number of sets is given by “successive unions”:

$$A_1 \cup \ldots \cup A_n = ((A_1 \cup A_2) \cup \ldots) \cup A_n)$$

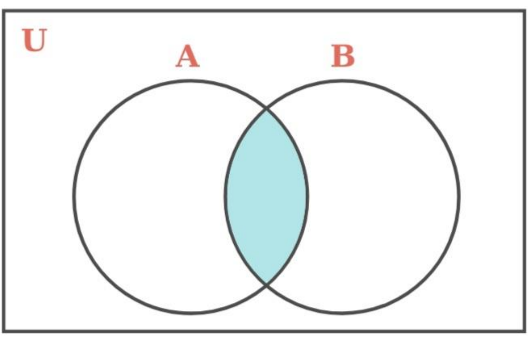
Because of the associative property, any order of “matches” to make the union leads to the same result. The union of an infinity number of sets Ak. In this case, it is defined by :

$$\cup_k A_k = \{x \in U \mid \exists k \; : \; x \in A_k$$

Intertersection of sets

Given two sets A and B, we their intersection as

$$A \cap B = \{x \in U \mid x \in A \; and \; x \in B\}$$



The intersection of A and B, it the set of elements x of U, such that, x belogs to A, and x belongs to B.

The intersection operation is commutative, associative and it has identity and inverse element :

1. Commutative: $A \cap B = B \cap A$
2. Associative: $(A \cap B) \cap C = A \cap (B \cap C)$
3. Identity element: $A \cap \emptyset = \emptyset \cap A = \emptyset$
4. Inverse element: $A \cap A^c = A^c \cap A = \emptyset$, where A^c represents the concept "complement".