Binary operations on sets

- The **Union** of the sets A and B, denoted $A \cup B$, is the set of all objects that are a member of A, or B, or both.
  The union of $\{1, 2, 3\}$ and $\{2, 3, 4\}$ is the set $\{1, 2, 3, 4\}$.

- The **Intersection** of the sets A and B, denoted A ∩ B, is the set of all objects that are members of both A and B.
  The intersection of $\{1, 2, 3\}$ and $\{2, 3, 4\}$ is the set $\{2, 3\}$.

- The **Set difference** of U and A, denoted $U \backslash A$, is the set of all members of U that are not members of A.
  The set difference {1,2,3} {2,3,4} is {1} , while, conversely, the set difference {2,3,4} {1,2,3} is {4} .

- When A is a subset of U, the set difference $U \backslash A$ is also called the **complement** of A in U. In this case, if the choice of U is clear from the context, the notation A' is sometimes used instead of $U \backslash A$, particularly if U is a universal set as in the study of Venn diagrams.

- The **Symmetric difference** of sets A and B, denoted $A \oplus B$, is the set of all objects that are a member of exactly one of A and B (elements which are in one of the sets, but not in both).
  For instance, for the sets {1,2,3} and {2,3,4} , the symmetric difference set is {1,4} .
  The Symmetric difference is the set difference of the union and the intersection, $(A \cup B)\ (A \cap B)$ or $(A\ B) \cup (B\ A)$.

- The **Cartesian product** of A and B, denoted $A \times B$, is the set whose members are all possible ordered pairs (a,b) where a is a

member of A and b is a member of B.
The cartesian product of {1, 2} and {red, white} is {(1, red), (1, white), (2, red), (2, white)}.

- The **Power set** of a set A is the set whose members are all possible subsets of A. For example, the power set of {1, 2} is { {}, {1}, {2}, {1,2} } .