Set Theory Formulas

What is the Set Theory?

Set Theory is the process of collection of objects, sets which are known as elements or numbers. It is believed that every object in *Mathematics* is considered as a set and every kind of theorem is treated as predicate calculus. It has been taken by axioms of the Set Theory. Let's understand what are the set theory formulas which are important to understand.

The set which entails all the parts in a given collection is known as a universal set which is recognised with a 'μ' symbol. It is pronounced as mu.

Let's understand set A and B, the two sets.

- The number of elements which are prevalent either in set A or B has is represented by ***n(A∪B)***
- ***n(A∩B)*** is the number of elements which are present in sets ***A*** and set ***B***.

$$n(A \cup B) = n(A) + (n(B) - n(A \cap B)$$

If we talk about Set A, B & C, the formula is:

$$n(A \cup B \cup C) = n(A) + n(B) + n(C) - n(A \cap B) - n(B \cap C) - n(C \cap A) + n(A \cap B \cap C)$$

Set Theory Formulas

Stated below are the important set theory formulas-

Set Theory Formulas on Properties

- Commutativity:
  - $A \cap B = B \cap A$
  - $A \cup B = B \cup A$
- Associativity:
  - $A \cap (B \cap C) = (A \cap B) \cap C$
  - $A \cup (B \cup C) = (A \cup B) \cup C$
- Distributivity: $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$
- Idempotent Law:
  - $A \cap A = A$
  - $A \cup A = A$
- Law of Ø and ∪:

- $A \cap \emptyset = \emptyset$
- $U \cap A = A$
- $A \cup \emptyset = A$
- $U \cup A = U$

Sets Theory Formulas of Difference of Sets

- $A - A = \emptyset$
- $B - A = B \cap A'$
- $B - A = B - (A \cap B)$
- $n(A \cup B) = n(A - B) + n(B - A) + n(A \cap B)$
- $n(A - B) = n(A \cup B) - n(B)$
- $n(A - B) = n(A) - n(A \cap B)$
- $(A - B) = A$ if $A \cap B = \emptyset$
- $(A - B) \cap C = (A \cap C) - (B \cap C)$
- $A \Delta B = (A-B) \cup (B- A)$
- $n(A') = n(\cup) - n(A)$

Sets Theory Formulas of Complement Sets

- Law of Double complementation: $(A')' = A$
- Laws of Empty set and Universal Set: $\emptyset' = \cup$ and $\cup' = \emptyset$
- Complement Law : $A \cup A' = U$, $A \cap A' = \emptyset$ and $A' = U - A$
- De Morgan's Laws: $(A \cup B)' = A' \cap B'$ and $(A \cap B)' = A' \cup B'$