Senior Secondary Course Learner's Guide, Mathematics (311)



Sets

- Collection of well defined objects.
- Set is denoted by capital letters and elements are in small letters

Representation of Set

I. Roaster Method/Tabular Method Listing of all elements separated by commas and enclosed them in curly bracket.

 $A = \{1, 2, 3, 4, 5\}$

II. Set-Builder Form Represented the elements by some common property $A = \{ x : x \in Nandx < 6 \}$

Classification of Sets

- Finite and Disjoint Sets
- Empty/Null Sets
- Singleton Sets
- Disjoint sets
- Equal and equivalent Sets

Sub-Sets

- If A and B are two sets seen that each elements of set A is an elements of set B.It is denoted as A ⊂ B
- $A \subseteq A \& 1 \subset A$
- If $A \subseteq B$ and $A B \subseteq A$ than A = B

- If A ⊆ C and A ≠ B, than A is proper subset of B
- If A is set with n (A) =P, then number subset of A = 2^p

Power Set

- The set of all subsets of the given set is known as power et
- The power set of a set A is denoted as P(A)
- If $|A| = n, P(A) = 2^n$

Universal Sets

- Universal set is the set of all objects pertaining to a particular problem
- It is denoted as U

Venn diagram

- Diagrammatical representation of set is known as Venn diagram
- Universal set U is represented by interior of rectangle and other set are represented by interior of circles

Components of a Set

- The component of set A is the set of A is the set of elements which are in U but not in A
- It is represented A' = U A
- $A^c = U A, U^c = Q$
- $A \cup A' = U, A \cap A' = Q, (A')' = A$

De Morgan's Law

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- a) $(A \cup B)' = A' \cap B'$
- b) $(A \cap B)' = A' \cup B'$

Operation on Sets

1. Intersection of Sets

The intersection of set A and B is denoted by $A \cap B$

 $A \cap B = \{x \colon x \in Aandx \in B\}$

2. Union of Sets

The union of two sets A and B is denoted as $A \cup B$

 $A \cup B = \{x : x \in Aorx \in B\}$

3. Difference of Sets

The difference of set B from set A is the set of those elements which are B but not in A

It is denoted as A-B

 $A - B = \{x: x \in Aandx \notin B\}$ $B - A = \{x: x \in Bandx \notin A\}$

Check YourProgress

- 1) If two sets do not have any common element, then these sets are as:
 - (A) Finite sets
 - (B) Infinite sets
 - (C) Disjoint sets
 - (D) Empty sets
- 2) In a set 'A' have three elements, then number of subsets of 'A' are:
 - (A) 3
 - (B) 9
 - (C) 8
 - (D) 6

- 3) The double complement of any set is equal to:
 - (A) Sets itself
 - (B) Null set
 - (C) Complement of set
 - (D) Undefined
- Between two sets 'A' and 'B: if A⊆B and B⊆A, then relationship between 'A' and 'B' as:
 - (A) A > B
 - (B) A < B
 - (C) A = B
 - (D) A = B = 0

5)
$$A = \{1, 2, 3, 4, 5, 6\}, B = \{2, 3, 4\}$$
 then

- B A is equal to:
- (A) $\{1,5,6\}$
- (B) $\{2,3,4\}$
- (C) $\{4,5,6\}$
- (D) $\{1,2,3\}$

STRETCH YOURSELF

1. By taking suitable example, prove De-Morgan's Law

(i)
$$(A \cup B)' = A' \cap B'$$

(ii)
$$(A \cap B) = A \cup B^{\dagger}$$

- 2. Draw Ven diagram for each of following case:
 - (i) $A \cap B$, When $B \subset A$

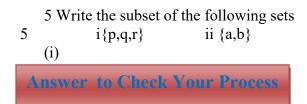
(ii) $A \cap B$, When A and B are disjoint sets

3. If $A = \{x : x \in N\}$ and $B = \{y : y \in Z \text{ and } -8 \le y \le 0\}$

Find $A \bigcup B$, and write your answer in the roster form and in set – builder form

4. By taking an example, prove that $(A-B) \cup (B-A) = (A \cup B) - (B \cap A)$

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- 1 D
- 2 C
- 3 A
- 4 C
- 5A