



Sets Ex 1.6 Q9

Given $A \cap B = \emptyset$, i.e., A and B are disjoint sets this can be represented by venn diagram as follows

To show: $A \subseteq B'$

This is clear from the venn diagram itself

$\therefore A$ is lying in the complement of B , but we give a proof of it.

So let $x \in A$

$$\therefore A \cap B = \emptyset,$$

$$\therefore x \notin B$$

$$\text{and so } x \in B' \quad [\because x \notin B \Rightarrow x \in B']$$

Thus $x \in A \Rightarrow x \in B'$. This is true for all $x \in A$

Hence, $A \subseteq B'$

Sets Ex 1.6 Q10

We need to show that $(A - B) \cap (A \cap B) = \emptyset$, $(A \cap B) \cap (B - A) = \emptyset$ and $(A - B) \cap (B - A) = \emptyset$

The 3 sets $A - B$, $A \cap B$ and $B - A$ may be represented by a venn diagram as follows

It is clear from the diagram that the 3 sets are pairwise disjoint, but we shall give a proof of it.

We first show that $(A - B) \cap (A \cap B) = \emptyset$

Let $x \in (A - B)$

$$\Rightarrow x \in A \text{ and } x \notin B \quad [\text{by definition of } A - B]$$

$$\Rightarrow x \notin A \cap B. \text{ This is true for all } x \in (A - B)$$

$$\text{Hence } (A - B) \cap (A \cap B) = \emptyset$$

On a similar lines, it can be seen that $(A \cap B) \cap (B - A) = \emptyset$

Finally, we show that $(A - B) \cap (B - A) = \emptyset$

We have,

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

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

$$\text{Hence, } (A - B) \cap (B - A) = \emptyset.$$

Sets Ex 1.6 Q11

We need to show $(A \cup B) \cap (A \cap B') = A$

Now,

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

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

$$= A \cap B'$$

$$= A$$

[Using associative property]

$[\because A \cap A = A \text{ and } B \cap A = A \cap B,]$
[by commutative law]

$[\because A \cup (A \cap B) = A]$

Sets Ex 1.6 Q12(i)

We have $A' \cup B = U$, the universal set

To show: $A \subset B$

Let, $x \in A$

$$\Rightarrow x \notin A' \quad [\because A \cap A' = \emptyset]$$

$$\because x \in A \text{ and } A \subset U$$

$$\Rightarrow x \in U$$

$$\Rightarrow x \in (A' \cup B) \quad [\because U = A' \cup B]$$

$$\Rightarrow x \in A' \text{ or } x \in B$$

But, $x \notin A'$,

$$\therefore x \in B$$

Thus, $x \in A \Rightarrow x \in B$

This is true for all $x \in A$

$$\therefore A \subset B$$

Sets Ex 1.6 Q12(ii)

We have $B' \subset A'$

To show: $A \subset B$

Let, $x \in A$

$$\Rightarrow x \notin A' \quad [\because A \cap A' = \emptyset]$$

$$\Rightarrow x \notin B' \quad [\because B' \subset A']$$

$$\Rightarrow x \in B \quad [\because B \cap B' = \emptyset]$$

Thus, $x \in A \Rightarrow x \in B$

This is true for all $x \in A$

$$\therefore A \subset B$$

***** END *****