Sets Ex 1.5 Q4

We have,

$A = \{3, 6, 12, 15, 18, 21\}$

$B = \{4, 8, 12, 16, 20\}$

$C = \{2, 4, 6, 8, 10, 12, 14, 16\}$

$D = \{5, 10, 15, 20\}$

If A and B are two sets, then the set $A - B$ is defined as

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

(i) $A - B = \{x \in A : x \notin B\} = \{3, 6, 15, 18, 21\}$

(ii) $A - C = \{x \in A : x \notin C\} = \{3, 15, 18, 21\}$

(iii) $A - D = \{x \in A : x \notin D\} = \{3, 6, 12, 18, 21\}$

(iv) $B - A = \{x \in B : x \notin A\} = \{4, 8, 16, 20\}$

(v) $C - A = \{x \in C : x \notin A\} = \{2, 4, 8, 10, 14, 16\}$

(vi) $D - A = \{x \in D : x \notin A\} = \{5, 10, 20\}$

(vii) $B - C = \{x \in B : x \notin C\} = \{20\}$

(viii) $B - D = \{x \in B : x \notin D\} = \{4, 8, 12, 16\}$

Sets Ex 1.5 Q5

(i)

$U = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$, $A = \{1, 2, 3, 4\}$, $B = \{2, 4, 6, 8\}$, $C = \{3, 4, 5, 6\}$

By the complement of a set A, which respect to the universal set U, denoted by A' or A^c or $U - A$, we mean $\{x \in U : x \notin A\}$.

Hence, $A' = \{x \in U : x \notin A\} = \{5, 6, 7, 8, 9\}$

(ii) $B' = \{x \in U : x \notin B\} = \{1, 3, 5, 7, 9\}$

(iii) $(A \cap C)' = \{x \in U : x \notin A \cap C\}$

Now,

$A \cap C = \{x : x \in A \text{ and } x \in C\} = \{3, 4\}$

$\therefore \quad (A \cap C)' = \{1, 2, 5, 6, 7, 8, 9\}$

Sets Ex 1.5 Q6

(i)

$U = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$

$A = \{2, 4, 6, 8\}$

$B = \{2, 3, 5, 7\}$

We have,

$$A \cup B = \{x : x \in A \text{ or } x \in B\}$$
$$= \{2, 3, 4, 5, 6, 7, 8\}$$

$$\therefore (A \cup B)' = \{x \in U : x \notin A \cup B\}$$
$$= \{1, 9\}$$

$$A' = \{x \in U : x \notin A\}$$
$$= \{1, 3, 5, 7, 9\}$$
$$B' = \{x \in U : x \notin B\}$$
$$= \{1, 4, 6, 8, 9\}$$

Hence, $A' \cap B' = \{1, 9\}$

Hence, $(A \cup B)' = A' \cap B' = \{1, 9\}$

(ii)

$$A \cap B = \{x : x \in A \text{ and } x \in B\}$$
$$= \{2\}$$
$$\therefore (A \cap B)' = \{x \in U : x \notin A \cap B\}$$
$$= \{1, 3, 4, 5, 6, 7, 8, 9\}$$

Also,

$$A' \cup B' = \{x : x \in A' \text{ or } x \in B'\}$$
$$= \{1, 3, 4, 5, 6, 7, 8, 9\}$$

Hence, $(A \cap B)' = A' \cup B' = \{1, 3, 4, 5, 6, 7, 8, 9\}$

********** END **********