

**Exercise: 1.7**

**Page Number:1.34**

**Question 1.**

**Solution:**

$$LHS = A' - B' = (A' \cap B')'$$

$$\therefore C - D = (C \cap D)' = A' \cap B = (B \cap A)' = B - A$$

$$\therefore (C \cap D)' = C - D$$

$$RHS = B - A$$

So,  $LHS = RHS$

**Question 2.**

**Solution:**

(i)

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

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

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

$$= A \cap B = RHS$$

Hence proved.

(ii)

$$LHS = A - (A - B)$$

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

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

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

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

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

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

$$= (A \cap B)$$

$$= RHS$$

Hence proved

(iii)

$$\begin{aligned}LHS &= A \cap (A \cup B)' \\&= A \cap (A' \cap B') \\&= (A \cap A') \cap (A \cap B') \\&= \phi \cap (A \cap B') \\&= \phi = RHS\end{aligned}$$

Hence proved.

(iv)

$$\begin{aligned}LHS &= A \Delta (A \cap B) \\&= \{A - (A \cap B)\} \cup \{(A \cup B) - A\} \\&= \{A \cap (A \cap B)'\} \cup \{(A \cup B) \cap A'\} \\&= \{A \cap (A' \cap B')\} \cup \{(A \cup B) \cap A'\} \\&= \{(A \cap A') \cup (A \cap B')\} \cup \{(A \cap A') \cap (B \cap A')\} \\&= (A \cap B') \cup (\phi) \\&= (A \cap B') \\&= A - B \\&= RHS\end{aligned}$$

**Question 3.**

**Solution:**

Let  $a \in C - B$

$\Rightarrow a \in C$  and  $a \notin B$

$\Rightarrow a \in C$  and  $a \notin A \because A \subset B$

$\Rightarrow a \in C - A$

Hence,  $C - B \subset C - A$

**Question 4.**

**Solution:**

(i)

$$\begin{aligned}
 (A \cap B) - B &= (A \cup B) \cap B' \\
 &= (A \cap B') \cap (B \cap B') \\
 &= (A \cap B') \cup \varnothing \\
 &= A \cap B' \\
 &= A - B
 \end{aligned}$$

$$(X - Y = X \cap Y')$$

(ii)

$$\begin{aligned}
 A - (A \cap B) &= A \cap (A \cap B)' \\
 &= A \cap (A' \cup B') \\
 &= (A \cap A') \cup (A \cap B') \\
 &= \varnothing \cup (A \cap B') \\
 &= A \cap B' \\
 &= A - B
 \end{aligned}$$

$$(X - Y = X \cap Y')$$

(iii)

$$\begin{aligned}
 A \cup (B - A) &= A \cup (B \cap A') && (X - Y = X \cap Y') \\
 &= (A \cup B) \cap (A \cup A') && (\text{Distributive law}) \\
 &= (A \cup B) \cap U && (U \text{ is the universal set})
 \end{aligned}$$

(iv)

$$\begin{aligned}
 (A - B) \cup (A \cap B) &= (A \cap B') \cup (A \cap B) && (X - Y = X \cap Y') \\
 &= A \cap (B' \cup B) && (\text{Distributive law}) \\
 &= A \cap U \\
 &= A
 \end{aligned}$$

XOPYKitab  
 Same textbooks, knock away