Practice Sheet-1 SETS

1. For any two sets A and B, prove that: A'- B'= B - A Solution: To prove, A' - B' = B - AFirstly we need to show $\mathsf{A}'-\mathsf{B}'\subseteq\mathsf{B}-\mathsf{A}$ Let $x \in A' - B'$ \Rightarrow X \in A' and x \notin B' \Rightarrow X \notin A and x \in B (since, A \cap A' = ϕ) $\Rightarrow X \in B - A$ It is true for all $x \in A' - B'$ $\therefore A' - B' = B - A$ Hence Proved. 2. For any two sets A and B, prove the following: (i) $A \cap (A' \cup B) = A \cap B$ (ii) $A - (A - B) = A \cap B$ (iii) $A \cap (A \cup B') = \varphi$ (iv) $A - B = A \Delta (A \cap B)$ Solution: (i) $A \cap (A' \cup B) = A \cap B$ Let us consider LHS A \cap (A' \cup B) Expanding $(A \cap A') \cup (A \cap B)$ We know $(A \cap A') = \phi$ $\Rightarrow \phi \cup (A \cap B)$ \Rightarrow (A \cap B) \therefore LHS = RHS Hence proved. 3. If A, B, C are three sets such that $A \subset B$, then prove that $C - B \subset C - A$. 4. For any two sets A and B, prove that (i) $(A \cup B) - B = A - B$ (ii) $A - (A \cap B) = A - B$ (iii) $A - (A - B) = A \cap B$ (iv) $A \cup (B - A) = A \cup B$ (V) $(A - B) \cup (A \cap B) = A$ Solution: (i) $(A \cup B) - B = A - B$ Let us consider LHS (A \cup B) – B $= (A-B) \cup (B-B)$ = $(A-B) \cup \phi$ (since $B-B = \phi$) = A–B (since, $x \cup \phi = x$ for any set) = RHS Hence proved.