

3. Prove, without using Venn diagrams, that

(a) $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$ and

(b) $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$,

for all sets A, B, C .

4. Prove, without using Venn diagrams, that the statements

(I) $A \subset B$,

(II) $A \cap B = A$, and

(III) $A \cup B = B$,

are equivalent to each other for all sets A and B .