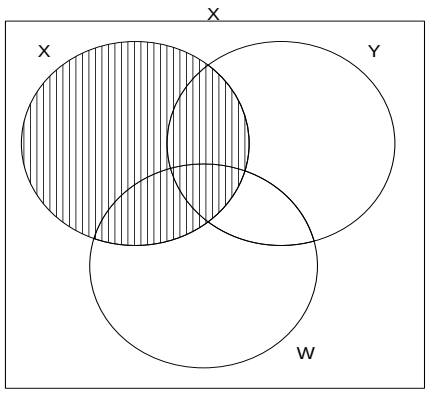
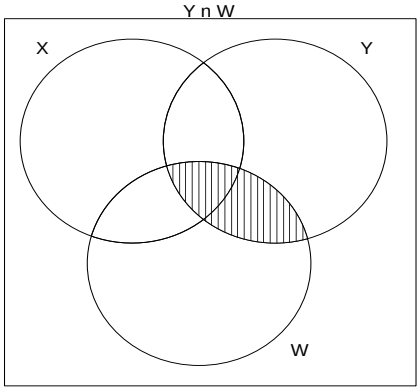
Activity 4-5

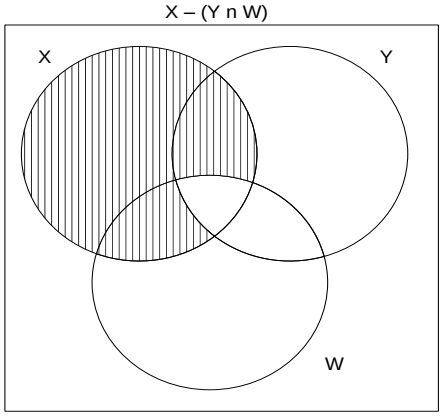
Use Venn diagrams to determine whether or not the given equations hold.

1. (a) Is $X - (Y \cap W) = (X - Y) \cup (X - W)$?

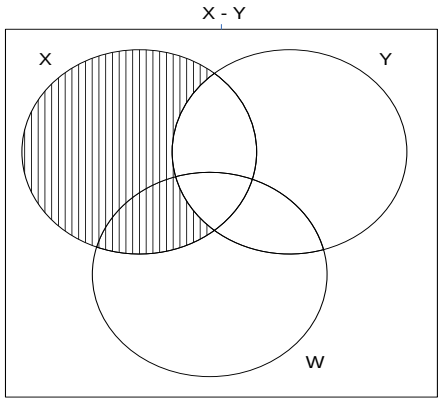
Left-hand side: $X - (Y \cap W)$

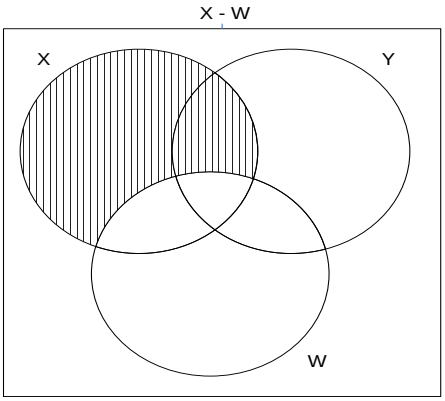


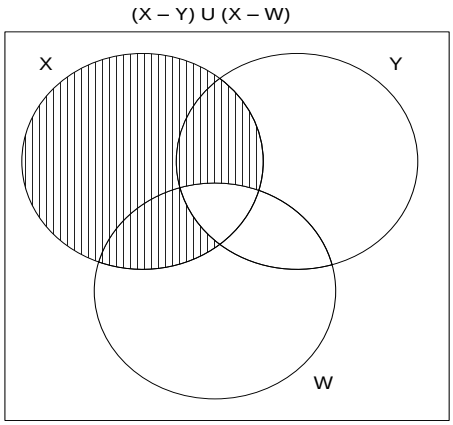




Right-hand side: $(X - Y) \cup (X - W)$



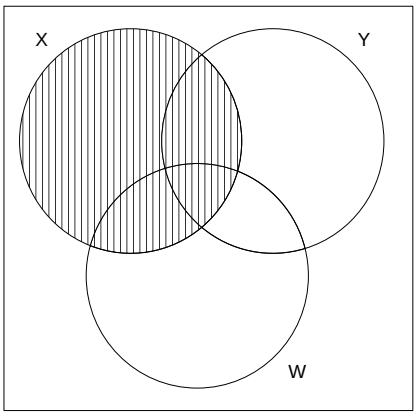




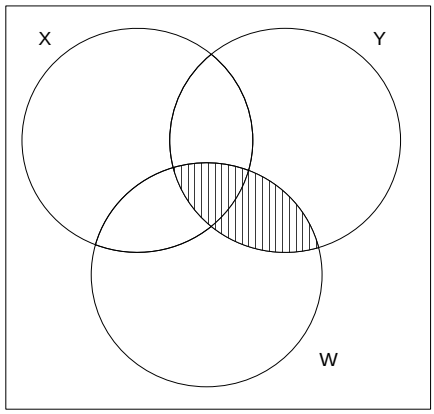
(b) Is $X \cap (Y \cap W) = (X \cap Y) \cap W$?

Left-hand side: $X \cap (Y \cap W)$

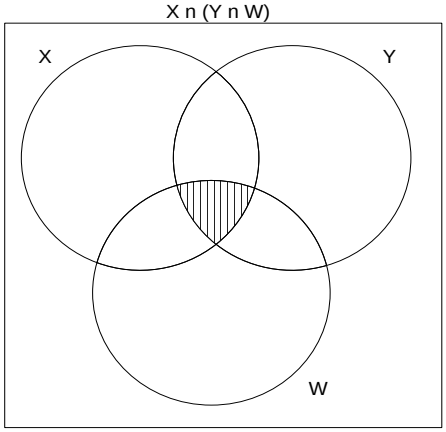
X



Y n W

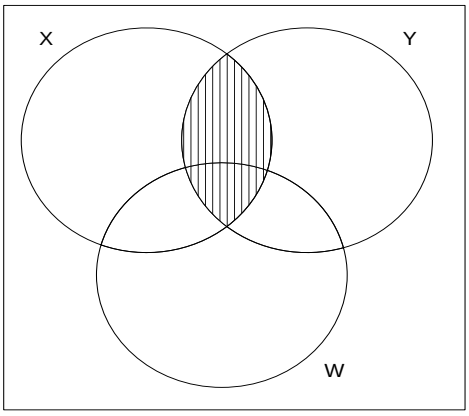


X n (Y n W)

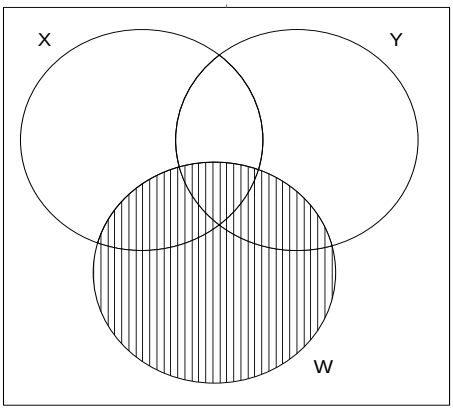


Right-hand side: $(X \cap Y) \cap W$

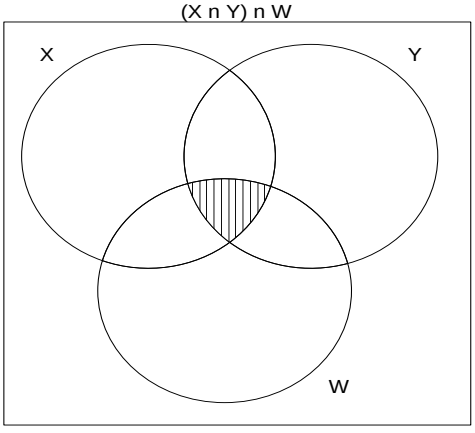
X n Y



W



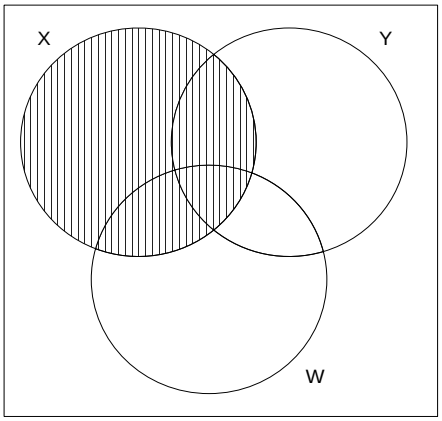
(X n Y) n W



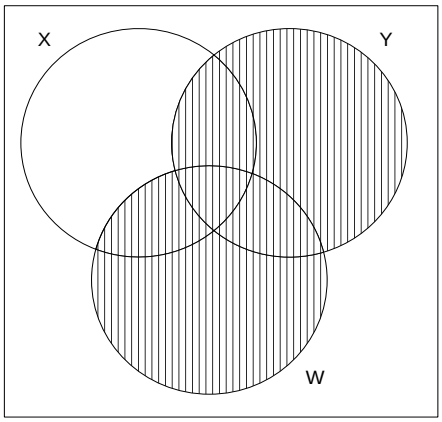
(c) Is $X \cap (Y \cup W) = (X \cap Y) \cup (X \cap W)$?

Left-hand side: $X \cap (Y \cup W)$

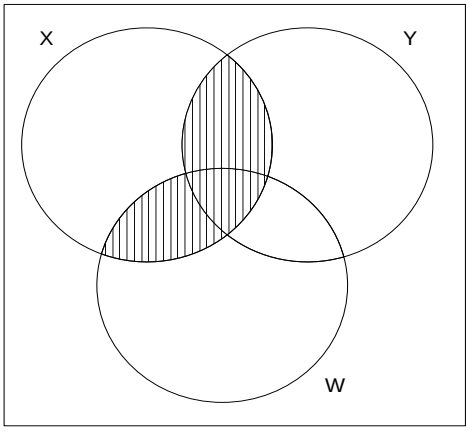
X



Y U W

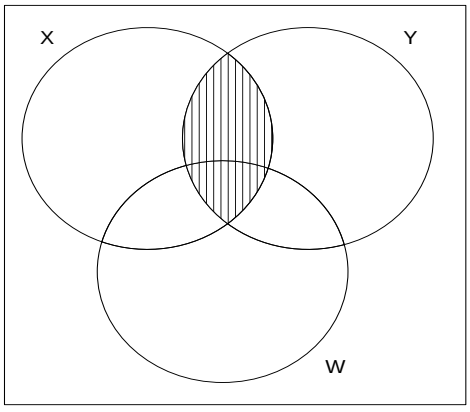


X n (Y U W)

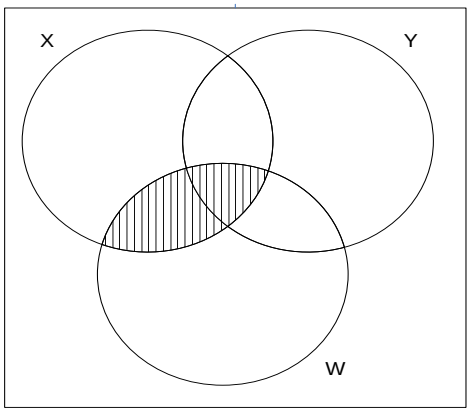


Right-hand side: $(X \cap Y) \cup (X \cap W)$

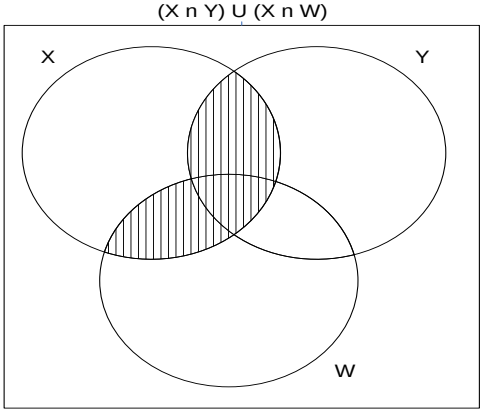
X n Y



X n W



(X n Y) U (X n W)



(d) The Venn diagrams for both (X′)′ and X look like this: