V.4. Let S be the following ordered sequence of elements $S = \langle 1, 2, 3, 4, 5, 6 \rangle$ and the universal set U be $\{1, 2, 3, 4, 5, 6\}$. Write down the characteristic vectors of

- $A = \{1, 2, 4, 5\}$;
- $B = \{3, 5\}$;
- $\emptyset$;
- $A \cup B$;
- $A \cap B$;
- $A \cup B^c$;
- $A \Delta B$.

Solutions:

- $C_A = [1, 1, 0, 1, 1, 0]$
- $C_B = [0, 0, 1, 0, 1, 0]$
- $C_\emptyset = [0, 0, 0, 0, 0, 0]$
- $A \cup B = \{1, 2, 3, 4, 5\} \rightarrow C_{(A \cup B)} = [1, 1, 1, 1, 1, 1, 0]$
- $A \cap B = \{5\} \rightarrow C_{(A \cap B)} = [0, 0, 0, 0, 1, 0]$

in order to find the characteristic vector of the set $(A \cup B^c)$, we first need to find the complement of the set B, then find the set $A \cup B^c$, then we will be able to find the characteristic vector of the set $(A \cup B^c)$.

$B^c = \{1, 2, 4, 6\}$

$A \cup B^c = \{1, 2, 4, 5, 6\}$

- $C_{(A \cup B^c)} = [1, 1, 0, 1, 1, 1]$

in order to find the characteristic vector of the set $(A \Delta B)$, we first need to find the set $A \Delta B$, then we will be able to find the characteristic vector of the set $(A \Delta B)$.

$A \Delta B = (A \cup B) - (A \cap B) = \{1, 2, 3, 4, 5\} - \{5\} = \{1, 2, 3, 4\}$

- $C_{(A \Delta B)} = [1, 1, 1, 1, 0, 0]$