

CSE 16
Winter 2022
Quiz 1

Solutions

1. (25 Points) Let $A \subseteq U$ and $B \subseteq U$. Suppose $|A \cap B| = 8$, $|A| = 10$, $|B| = 15$ and $|U| = 20$. Determine

$$|\mathbb{P}(\mathbb{P}(\overline{A \cup B}))|$$

(Please show all intermediate steps in your calculation.)

Solution:

By the principle of inclusion-exclusion we have

$$|A \cup B| = |A| + |B| - |A \cap B| = 10 + 15 - 8 = 17$$

$$|\overline{A \cup B}| = 20 - 17 = 3$$

$$|\mathbb{P}(\overline{A \cup B})| = 2^3 = 8$$

$$|\mathbb{P}(\mathbb{P}(\overline{A \cup B}))| = 2^8 = \mathbf{256}$$

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2. (25 Points) Let $S = \{1, 2, 3, 4\}$. Determine the set $\{A \in \mathbb{P}(S) : |A| = 2\}$.

Solution:

Observe that $\{A \in \mathbb{P}(S) : |A| = 2\} = \{A \subseteq S : |A| = 2\}$. Therefore we seek the set of all 2-element subsets of S , and hence

$$\{A \in \mathbb{P}(S) : |A| = 2\} = \{\{1, 2\}, \{1, 3\}, \{1, 4\}, \{2, 3\}, \{2, 4\}, \{3, 4\}\}.$$

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