# Quiz 1: Sets, Functions, Relations, Propositional Logic

1. Let $A = \{1, 2, 3\}$ and $B = \{\emptyset, \{1\}, \{2\}, \{3\}, \{1, 2, 3\}\}$. Which of the following statements is true?

   (A) $A \subseteq B$

   (B) $A \in B$

   (C) $A \cap B \neq \emptyset$

   (D) $A \cup B = B$

   **Answer is:**

2. Let $A = \{1, 2\}$. What is the set corresponding to $Power(A) \times A$, where $Power(A)$ denotes the power set of $A$? (Write down the set with all the elements).

3. Let $A$, $B$, and $C$ be (finite) sets such that $|A| = |B|$. (For a (finite) set $S$, $|S|$ denotes the number of elements in $S$.) Which of the following statements is necessarily true? (For sets $S_1$ and $S_2$, $S_1 \times S_2$ denotes the "Cartesian product" of sets $S_1$ and $S_2$, and $S_1 \setminus S_2 = \{x \in S_1 \mid x \notin S_2\}$.)

   (A) $|A \times C| = |B \times C|$

   (B) $|A \cup C| = |B \cup C|$

   (C) $|A \cap C| = |B \cap C|$

   (D) $|A \setminus C| = |B \setminus C|$

   **Answer is:**

4. Consider the set $X$ defined inductively as follows: (1) $(3, 5) \in X$, (2) if $(x, y) \in X$ then $(x + 2, y) \in X$, and (3) if $(x, y) \in X$ then $(y, x) \in X$. ($X$ is the smallest set which satisfies the conditions (1), (2), (3)). Which of the following pairs is a member of $X$?

   (A) $(222, 402)$

   (B) $(1, 7)$

   (C) $(151, 1171)$

   (D) $(6, 3)$

   **Answer is:**

5. Complete the following Truth Table.

| $P$ | $Q$ | $\neg P$ | $(\neg P) \vee Q$ | $P \rightarrow Q$ |
|---|---|---|---|---|
| T | T | | | |
| T | F | | | |
| F | T | | | |
| F | F | | | |