Problem 1. For a positive integer n, how many non-empty sets of positive integers have largest element n?

A) 2^{n-1} B) 2^n C) 2^{n+1} D) ∞

Solution. A)   □

Problem 2. How many lists of length n drawn from $\{1, 2, \ldots, n\}$ have last element n?

A) $n!$ B) $(n-1)!$ C) $(n)_{n-1}$

Solution. The correct answer is n^{n-1}, which is not in the list. If the question asked for lists without replacement, the answer would have been B).   □

Problem 3. Which of the following are elements of $2^{2^{\{1,2,3\}}}$?

A) 2^{2^3} B) 256 C) $\{\{3\}\}$

Solution. C)   □

These problems are just for discussion; they are not part of the quiz:

Problem 4. For any sets X and Y, the sets $X \times \{1\}$ and $Y \times \{2\}$ are disjoint.

A) True   B) False

Solution. A)   □

Problem 5. Suppose that A is a finite set with a elements. How many elements does $A \times A$ have?

A) a B) $2a$ C) a^2 D) ∞

Solution. C)   □

Problem 6. Let X be the set of integers that are divisible by 2, let Y be the set of integers that are divisible by 3, and let Z be the set of integers that are divisible by 6. Which of the following are true?

A) $X \cap Y \subset Z$

B) $Z \subset X \cap Y$

C) Both

D) Neither

Solution. C)   □