QUIZ 2 **WED., APR. 4** **NAME:**

DIRECTIONS:

- No papers, phones, calculators, or gadgets are permitted to be out during the quiz.
- Show all work, clearly and in order **You will lose points if any of these instructions are not followed.**

Questions	Points	Score
1	1.5	
2	1.5	
3	2	
Total	5	

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Problem 1: (1.5 point) Let A_i be sets for $i = 1, 2, 3, ..., n$. What is the definition of the n-fold Cartesian Product of sets A_1, A_2,...,A_n?

The n-fold Cartesian product of sets A_1,...,A_n is given by

$$A_1 \times A_2 \times \cdots \times A_n = \{(a_1, a_2, ..., a_n) | a_j \in A_j \text{ for } j = 1, 2, ..., n\}.$$

Problem 2: (1.5 point) State the Well-Ordering Principle for $\mathbb{Z}$.

If A is a non-empty subset of the positive integers, then A has a least element. That is, there exists an element $a_0 \in A$ such that for all $a \in A$, $a_0 < a$.

Problem 3: (2 points) Consider the set of integers, $\mathbb{Z}$. Prove that the multiplicative identity is unique.

Proof: Suppose 1 and $1'$ are both multiplicative identities. Therefore, for all $a \in \mathbb{Z}$

$$(1) \quad 1 \cdot a = a \cdot 1 = a,$$

and

$$(2) \quad 1' \cdot a = a \cdot 1' = a.$$

In particular (1) holds for $a = 1'$ and (2) holds for $a = 1$ hence

$$1 = 1 \cdot 1' = 1' \cdot 1 = 1'.$$

Therefore the multiplicative identity must be unique.