

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	
2	2	
3	2	
Total	5	

Problem 1: (1 point) Suppose A and B are sets.

(a) (0.5 points) Argue that if $A = B$ then $A \subseteq B$ and $B \subseteq A$.

Suppose $A = B$. Then by definition, they contain all the same elements so if $x \in A$ then since B contains all the same elements as A , $x \in B$ as well. Similarly if $x \in B$ then since A contains all the same elements as B , $x \in A$ also.

(b) (0.5 points) Argue that if $A \subseteq B$ and $B \subseteq A$, then $A = B$.

Suppose $A \subseteq B$, then B contains all the elements of A . Now suppose $B \subseteq A$ as well, then A contains all the elements of B . So if A contains all the elements of B but at the same time B contains all the elements of A , they must have the **same** elements. Hence $A = B$.

Problem 2: (2 points) For each of the following symbols, what is the translation into “words”?

(a) (0.5 points) \in “_____ is in _____.”

(b) (0.5 points) \mathbb{N} “_____ Natural Numbers _____.”

(c) (0.5 points) \mathbb{Z} “_____ Integers _____.”

(d) (0.5 points) \mathbb{Q} “_____ Rational Numbers _____.”

Problem 3: (2 points) Let $A = \{a, b, 3, \pi, \frac{1}{8}\}$, $B = \{a\}$, $C = \{b, \pi, a, 10\}$. For each of the following, mark the statement as either true (T) or false (F).

(a) (0.5 points) $B \subseteq C$. “_____ T _____.”

(b) (0.5 points) $A \subseteq A$. “_____ T _____.”

(c) (0.5 points) $C \subset A$. “_____ F _____.”

(d) (0.5 points) $B \subset C$. “_____ T _____.”