

**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) What is the definition of  $A \subseteq B$ ? How does that differ from  $A \subset B$ ?

We say  $A \subseteq B$  ( $A$  is a subset of  $B$ ) if for all  $a \in A$ , the  $a \in B$ .  $A \subset B$  ( $A$  is a proper subset of  $B$ ) if  $A$  is a subset of  $B$  but there exists a  $b \in B$  such that  $b \notin A$ .

**Problem 2:** (2 point) Suppose  $A$  and  $B$  are sets. Show that  $A = B$  if and only if  $A \subseteq B$  and  $B \subseteq A$ .

see lecture notes

**Problem 3:** (2 points) For each of the following symbols, what is the translation into “words”?

(a) (0.5 points)  $\in$  “\_\_\_\_\_ in \_\_\_\_\_.”

(b) (0.5 points)  $\forall$  “\_\_\_\_\_ for all \_\_\_\_\_.”

(c) (0.5 points)  $\exists$  “\_\_\_\_\_ there exists \_\_\_\_\_.”

(d) (0.5 points)  $\iff$  “\_\_\_\_\_ if and only if \_\_\_\_\_.”