

# DISCRETE MATHEMATICS

## HOMEWORK ASSIGNMENT I

### PROBLEMS

1. Consider the following two properties: (a)  $A \in B$ , and (b)  $A \subseteq B$ .
  - (i) Give examples of sets  $A$  and  $B$  where property (a) holds but (b) fails.
  - (ii) Give examples of sets  $A$  and  $B$  where property (a) fails but (b) holds.
  - (iii) Give examples of sets  $A$  and  $B$  where properties (a) and (b) both hold.
  - (iv) Give examples of sets  $A$  and  $B$  where properties (a) and (b) both fail.
2. Prove that  $1 \cdot 1 = 1$ .
3. (Ordered pairs can be constructed from unordered pairs.) If  $A$  and  $B$  are sets, define  $(A, B)$  to be  $\{\{A\}, \{A, B\}\}$ .  $(A, B)$  is called an *ordered pair*. Using the axioms of set theory, explain why
  - (i)  $(A, B)$  is a legitimate set. (That is, show that the axioms of set theory guarantee that if  $A$  and  $B$  are sets, then  $(A, B)$  is also a set.)
  - (ii)  $(A, B) = (C, D)$  if and only if  $A = C$  and  $B = D$ .