Assignment 1

Due September 17, 1:30 p.m. Make sure your proofs are clear: Justify each step and use the precise definitions seen in class or in the textbook.

**Problem 1**

Prove the following theorem.

**THEOREM.** For all sets $A$, $B$, $C$, and $D$, if $A \subseteq B$ and $C \subseteq D$, then $(A \cap C) \subseteq (B \cap D)$.

**Problem 2**

Prove the following theorem.

**THEOREM.** For any sets $A$ and $B$, if $A \subseteq B$, then $\mathcal{P}(A) \subseteq \mathcal{P}(B)$.

**Notes:**

- $\mathcal{P}(A)$ stands for the *power set* of $A$, i.e., $\mathcal{P}(A) = \{Q \mid Q \subseteq A\}$.
- Be careful about distinguishing statements such as $x \in A$, $x \in \mathcal{P}(A)$, $x \in A$, and $x \in \mathcal{P}(A)$.