You are expected to do the following problems to a high standard (i.e., at least well enough to be published in a textbook) for full credit.

1. Let \( \{A_\alpha : \alpha \in \Lambda \} \) be an indexed collection of sets and let \( \Delta \) be a nonempty subset of \( \Lambda \). Prove the following statements:
   
   (a) \( \bigcup \{A_\alpha : \alpha \in \Delta \} \subseteq \bigcup \{A_\alpha : \alpha \in \Lambda \} \)
   
   (b) \( \bigcap \{A_\alpha : \alpha \in \Lambda \} \subseteq \bigcap \{A_\alpha : \alpha \in \Delta \} \)

2. Let \( f : X \to Y \) and \( g : Y \to X \) be one-to-one and onto functions. Then \( g = f^{-1} \) iff \( f \circ g = \text{id}_Y \) and \( g \circ f = \text{id}_X \).