

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 Δ be a nonempty subset of Λ . 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 $f : X \rightarrow Y$ and $g : Y \rightarrow X$ be one-to-one and onto functions. Then $g = f^{-1}$ iff $f \circ g = \text{id}_Y$ and $g \circ f = \text{id}_X$.