Exercises (to be done but not turned in): 8.3-8.5, 8.8-8.10; 9.2-9.5, 9.8-9.9.
Problems to be turned in: All numbers refer to problems in the Yellow Book.

1. 8.7.

2. 8.9.

3. Let $I = \{x \in \mathbb{R} \mid 0 < x < 1\}$. For $x \in I$, let $A_x = (4 - x, 5 + x)$, i.e., let $A_x$ be the open interval between $4 - x$ and $5 + x$. Prove that $\bigcap_{x \in I} A_x = [4, 5]$, the closed interval between 4 and 5 (inclusive).

4. Let $A$, $B$, $C$, and $D$ be sets.
   (a) Find an example of sets $A$, $B$, $C$, and $D$ where $A \times B \subseteq C \times D$ but $A \not\subseteq C$.
   (b) Complete and prove the following theorem: If $A \times B \subseteq C \times D$ and (extra condition on $B$), then $A \subseteq C$.

5. Let $A$, $B$, and $C$ be sets.
   (a) Is $A \times (B \cup C) \subseteq (A \times B) \cup (A \times C)$? Prove or give a counterexample.
   (b) Is $A \times (B \cup C) \supseteq (A \times B) \cup (A \times C)$? Prove or give a counterexample.

6. 9.8.