1. Let U be a universal set and let A, B be subsets of U. Show that

$$(A \cap B)_U^C = A_U^C \cup B_U^C.$$

2. Let A, B and C be sets. Show that

$$A \times (B \setminus C) = (A \times B) \setminus (A \times C).$$

3. Let A and B be sets. Show that

$$(A \times B) \cap (B \times A) = \emptyset \iff A \cap B = \emptyset.$$

4. Let A, B and C be sets. If $A \cap B = A \cap C$ and $A \cup B = A \cup C$, then show that $B = C$.