**Assignment #4 – Due Monday 9/26**

1. Given the following three sets that are all subsets of universal set $U = \{0, 1, 2, 3, 4, 5, 6, 7, 8, 9\}$ find all of the following.

$A = \{4, 8\}$ $B = \{1, 3, 5, 7, 9\}$ $C = \{x \mid 3 \leq x < 9\}$

$A \cup B =$

$A \cap C =$

$B - C =$

$C' =$

$(A' \cup B) - C =$

$A \times C =$

2. Let $A$, $B$, and $C$ be sets. Using basic identities concerning sets prove that

$$(A \cup (A' \cap B))' = A' \cap B'$$

3. Let $A$, $B$, and $C$ be sets. Prove that

$$A \times (B \cup C) = (A \times B) \cup (A \times C)$$

by showing that $A \times (B \cup C) \subseteq (A \times B) \cup (A \times C)$ and also that $(A \times B) \cup (A \times C) \subseteq A \times (B \cup C)$.

4. Let $A$ and $B$ be sets such that $A \subseteq B$. Prove that $\mathcal{P}(A) \subseteq \mathcal{P}(B)$.

5. Let $A$ and $B$ be sets. Prove that $(B - A) \cup A = B$ if and only $A \subseteq B$ by proving that each of the following statements is true.

$(B - A) \cup A = B$ implies that $A \subseteq B$

$A \subseteq B$ implies that $(B - A) \cup A = B$