ASSIGNMENT 4, DUE WEDNESDAY 21 FEBRUARY

1. Let A and B be sets. Prove that $A \subseteq A \cup B$. Identify which tautology you are using in your proof.

2. Let A, B and C be sets. Prove that $A - (B \cup C) = (A - B) \cap (A - C)$.

3. Let the universe be the set $\mathbb{Z}$. Let E, D, $\mathbb{Z}^+$ and $\mathbb{Z}^-$ be the sets of all even, odd, positive and negative integers, respectively. Find the following in terms of unions and intersections of the above sets, along with $\{0\}$.

(a) $E - \mathbb{Z}^+$.
(b) $\mathbb{Z}^+ - E$.
(c) $D - E$.
(d) $(\mathbb{Z}^+)^c$.
(e) $\mathbb{Z}^+ - \mathbb{Z}^-$.
(f) E^c.
(g) $E - \mathbb{Z}^-$.
(h) $(E \cap \mathbb{Z}^-)^c$.
(i) $\varnothing^c$.

4. Prove that if A is a set, then $A \times \varnothing = \varnothing$.

5. Let A and B be subsets of a set U. Prove that $A \cap B = \varnothing$ if and only if $A \subseteq B^c$.