Discrete Structures, Fall 2014, Problem Set 7

You must write the solutions to these problems legibly on your own paper, with the problems in sequential order, and with all sheets stapled together.

For each of the following, give a proof of the statement if it is true, or a counterexample if the statement is false. Remember, counterexamples must include specific values and enough work shown to demonstrate that they are actual counterexamples. **IN OTHER WORDS, NOT ALL OF THESE ARE TRUE!**

1. Prove for all sets A, B, C, and D, if $C \subseteq A$ and $(B - A)^c \subseteq D^c$, then $C \cap B \subseteq A - D$.
2. Prove for all sets A and B, $(A - B) \cup (B - A) = (A \cup B) - (A \cap B)$.
3. Prove for all sets A, B, and C, if $B \cap C \subseteq A$, then $(C - A) \cap (B - A) = \emptyset$.
4. Prove for all sets A, B, and C, $A \times (B \cup C) \subseteq (A \times B) \cup (A \times C)$.
5. Prove for all sets A, B, and C, if $A \cup C = B \cup C$, then $A = B$.