Homework 3

1. (a) Prove that $(A \cap B) \subseteq A$ for all sets A and B.
   (b) Give a counterexample to $(A \cap B) = A$.
   (c) Which step of your proof of $(A \cap B) \subseteq A$ is not 'reversible.'

2. Prove that $(A \cup B) \setminus C = (A \setminus C) \cup (B \setminus C)$ for all sets A, B, and C.

3. Let p : it is raining
   q : it is snowing
   r : there is a storm
   Write the logical form of the statements below.

   (a) If there is a storm, it is raining or snowing.
   (b) It is raining but not snowing if and only if there is no storm.

4. Consider the following statement: If you do not study, you will fail Math 280.

   (a) Let p : you study
   q : you will pass Math 280.
   What is the logical form of the statement above?
   (b) What is the contratrapositive (in a sentence, not logical form) of the statement above?
   (c) What is the converse (in a sentence, not logical form) of the statement above?

5. section 1.5 problem 5 (do not use a truth table)

6. section 2.1 5,6