In Class Activity
MAT 300, Spring 2004
February 17, 2004

Let A, B, and C be subsets of U. For each of the following, either prove the statement or note that it has already been proven.

1. $A \cup \varnothing = A$
2. $A \cap \varnothing = \varnothing$

3. Idempotent Laws:
    a. $A \cup A = A$
    b. $A \cap A = A$

4. Associative Laws:
    a. $(A \cup B) \cup C = A \cup (B \cup C)$
    b. $(A \cap B) \cap C = A \cap (B \cap C)$
    c. What about this one? $(A \setminus B) \setminus C = A \setminus (B \setminus C)$

5. Commutative Laws:
    a. $A \cup B = B \cup A$
    b. $A \cap B = B \cap A$
    c. What about this one? $A \setminus B = B \setminus A$

6. Distributive Laws:
    a. $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$
    b. $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$

7. $A \subseteq B$ if and only if $A \setminus B = \varnothing$

8. $A \cap B = \varnothing$ if and only if $A \setminus B = A$

9. $\varnothing' = U$

10. $(A')' = A$

11. $A \subseteq B$ if and only if $B' \subseteq A'$

12. DeMorgan's Laws:
    a. $(A \cap B)' = A' \cup B'$
    b. $(A \cup B)' = A' \cap B'$

13. $A \setminus (B \cup C) = (A \setminus B) \cap (A \setminus C)$

14. $A \cup A' = U$ and $A \cap A' = \varnothing$

15. $\varnothing \subseteq A$