CMSC 250 Homework 10 Fall 2005
0201 & 0202

Due Wed Nov 2 at the beginning of your discussion section.

You must write the solutions to the problems single-sided on your own lined paper, with all sheets stapled together, and with all answers written in sequential order or you will lose points.

1. Prove for all sets A,B and C

   $(A - B) - C = (A - C) - B$

2. Prove for all sets A,B and C

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

3. Prove for all sets A and B,

   $(B^c \cup (B^c - A))^c = B$

4. Prove each statement is true or find a counterexample. Illustrate each statement by drawing a Venn diagram. Assume all sets are subsets of a universal set U.

   (a) For all sets A, B and C, if A $\subseteq B$ then $A \cap (B \cap C)^c = \emptyset$

   (b) For all sets A and B, if $B \subseteq A^c$ then $A \cap B = \emptyset$.

5. (a) Find P($\emptyset$)

   (b) Find P(P($\emptyset$))

   (c) Find P(P(P($\emptyset$)))

6. Let $A = \{a, b, c, d, e, f\}$, $A_1 = \{a, b\}$, $A_2 = \{c, d\}$, $A_3 = \{e, f\}$.

   (a) Are A_1, A_2, and A_3 mutually disjoint?

   (b) Explain why $\{A_1, A_2, A_3\}$ is a partition of A.

   (c) Alter the set A_3 in two different ways so that the new collection of subsets $\{A_1, A_2, A_3\}$ fails to be a partition of A for a different reason for each of the alterations.

7. Your Social Security number (SSN) is a 9 digit number.

   (a) How many different SSN are possible (assuming no other restrictions)?

   (b) What is the probability that a SSN chosen at random contains no repetition?