CMSC 250 Fall 2004 — Homework 9

Due Wed., Nov. 3 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.

Denote A' the complement of A and $P(A)$ the power set of A.

1. Find $P(\emptyset)$ and $P(P(P(\emptyset)))$.
2. Prove or disprove each of the followings:
   (a) For all sets A and B, $(A - B) \cup (A \cap B) \subseteq A$.
   (b) For all sets A and B, if $A \subseteq B$ then $B' \subseteq A'$.
   (c) For all sets A,B and C, $A \times (B \cap C) = (A \times B) \cap (A \times C)$.
   (d) For all sets A,B and C, if $B \cap C \subseteq A$ then $(C - A) \cap (B - A) = \emptyset$.
   (e) For all sets A,B and C, $A - (B - C) = (A - B) \cup C$.
   (f) For all sets A and B, $P(A \cap B) = P(A) \cap P(B)$.
3. Prove, by induction:
   (a) If $A \subseteq B_i$ for all i, then $A \subseteq (B_1 \cap B_2 \cap ...)$.
   (b) If $A_i \subseteq B$ for all i, then $(A_1 \cup A_2 \cup ...) \subseteq B$.