ECE 5510 Fall 2009: Homework 1

Due: 5pm, Thursday, September 3, in ECE 5510 HW locker.

1. Y&G 1.2.1

2. Let $A \subset B$. Which one is true: $A^c \subset B^c$ or $B^c \subset A^c$? Justify your answer.

3. Y&G 1.4.2

4. The exclusive or operator $\oplus$ is defined as $E \oplus F = (E \cap F^c) \cup (F \cap E^c)$. Use only the basic properties of set operations and the basic axioms of a probability measure to prove that $P[E \oplus F] = P[E \cap F^c] + P[E^c \cap F]$. Justify each step of your proof!!

5. Given three arbitrary events E_1, E_2, and E_3, prove that

$$P[E_1 \cup E_2 \cup E_3] = P[E_1] + P[E_2] + P[E_3] - P[E_1 \cap E_2] - P[E_1 \cap E_3] - P[E_2 \cap E_3] + P[E_1 \cap E_2 \cap E_3].$$