Assignment #5

Due on Monday February 11, 2008

Read Section 2.1 on *The Definition of Conditional Probability,* pp. 49–18, in DeGroot and Schervish.
Read Section 2.2 on *Independent Events,* pp. 56–64, in DeGroot and Schervish.

Do the following problems

1. Let $(\mathcal{C}, \mathcal{B}, \Pr)$ be a probability space. Prove that if E_1 and E_2 are independent events in $\mathcal{B}$, then so are E_1 and E_2^c.

   Hint: Observe that $E_1 \setminus E_2$ is a subset of E_1.

2. Exercises 1 and 2 on page 55 in the text

3. Exercise 5 on page 55 in the text

4. Exercise 11 on page 55 in the text

5. *[The Monte Hall Problem].* In a game show, suppose there are three curtains. Behind one curtain is a nice prize while behind the other two there are worthless prizes. A contestant selects one curtain at random, and then Monte Hall (the game show host) opens one the other two curtains to reveal a worthless prize. Hall then expresses the willingness to trade the curtain that the contestant has selected for the other curtain that has not been opened. Should the contestant switch curtains or stick with the one that she has? If she sticks with the one she has then the probability of winning the prize is 1/3. Hence, to answer this question, you must determine the probability that she wins the prize given that she switches.