Math 351, Probability  
Problem Set 4  
Due October 2, 2012, in class

1. You get two letters in the mail one day. The first letter you open is from a woman. Find the probability that the other letter is also from a female if

   (a) the mailman does not look at the letters before he gives them to you,
   (b) the mailman has a ladies first policy and will always hand you a letter from a woman first if there is such a letter.

2. Each of thirteen people is given 4 cards from a standard deck of 52 cards. What is the probability that each of them has one spade?

3. Urn $A$ has 99 red balls and 1 green ball. Urn $B$ has 1 red ball and 99 green balls. An urn is picked at random and a ball is chosen from it. If the ball is red, what is the probability that it came from urn $A$?

4. A fair die is rolled. If the outcome is $i$, then a ball is drawn from an urn that has $i$ red balls and 1 blue ball. Suppose that a blue ball was drawn. For each $i = 1, 2, ..., 6$, determine the probability that the outcome of the roll of the die was $i$.

5. Assume $P(E) = 0.5$, $P(F) = 0.3$, and events $E$ and $F$ are independent. Find $P(E \cup F)$.

6. In a class, there are 5 girls who are at least 20, 7 boys who are under 20 and 9 girls who are under 20. Is it possible for the events at least 20 and girl to be independent if a student is drawn at random from the class?