Instructions: Your solutions must appear in an organized and legible format to be given full consideration.

1. (ex5 pp102) An urn contains 6 white and 9 black balls. If 4 balls are to be randomly selected without replacement, what is the probability the first 2 selected are white and the last 2 black?

2. (ex11 pp102) Two cards are randomly chosen without replacement from an ordinary deck of 52 cards. Let $B$ be the event that both cards are aces; let $A_s$ be the event that the ace of spades is chosen, and $A$ be the event that at least one ace is chosen. Find
   
   (a) $P(B|A_s)$.
   (b) $P(B|A)$.

3. (ex16 pp102) 98% of all babies survive delivery. However, 15% of all births involve Cesarean ($C$) sections, and when a $C$ section is performed the bay survives 96% of the time. If a randomly chosen pregnant woman does not have a $C$ section, what is the probability that her baby survives?

4. (ex3 pp110) Consider a school community of $m$ families, with $n_i$ of them having $i$ children, $i = 1, \ldots, k$, $\sum_{i=1}^{k} kn_i = m$.

   Consider the following methods for choosing a child:

   (a) Choose on of the $m$ families at random and then randomly choose a child from that family.
   (b) Choose one of the $\sum_{i=1}^{k} kin_i$ children at random.

   Show that method 1 is more likely than method 2 to result in the choice of a firstborn child.

   Hint: In solving this problem, you will need to show that

   $$\sum_{i=1}^{k} in_i \sum_{j=1}^{k} \frac{n_j}{j} \geq \sum_{i=1}^{k} n_i \sum_{j=1}^{k} n_j$$

   To do so, multiply the sums and show that, for all pairs $i, j$, the coefficient of the term $n_in_j$ is greater in the expression on the left than in the one on the right.