Math 2 HW #1

1. This problem concerns the game of poker. I use a number and letter to indicate a specific card, for example $9s$ is the nine of spades. Email me if you do not understand.

   (a) How different distinct five card poker hands are there?

   (b) A five card poker hand is dealt from a standard 52 card pack. What is the probability of "four of a kind" (that is four cards of the same rank; one example of a hand that ranks as four of a kind is $2h, 5c, 5d, 5h, 5s$).

   (c) What is the probability of "at least a pair"; that is, at least two cards in the hand have the same rank?

   (d) What is the probability of a "flush"; that is, all five cards have the same suit?

2. (Problem 2.30 from *A first course in probability* by Sheldon Ross; exact wording altered) A forest contains 20 elk. Five are captured, tagged and released. Later four elk are captured. What is the probability that 2 of these 4 have been tagged?

3. (Problem 3.43 from *A first course in probability* by Sheldon Ross; exact wording altered) There are three coins in a box. One is a two-headed coin, another is a fair coin, and the third is a trick coin that flips heads 75% of the time. A coin is taken at random from the box and flipped; it shows heads. What is the probability it was the two-headed coin?

4. Suppose that I am playing golf. A golf pro is watching from a long ways off. He knows that for the shot I'm attempting, 40% of golfers use a 5-iron, 40% use a 4-iron, and 20% use a 5-wood. Suppose the golf pro also knows that I slice 30% of shots hit with my 5-iron, 50% of shots hit with my 4-iron, and 55% of shots hit with my 5-wood. I hit the ball and he sees the ball slice. What is the chance I was using my 4-iron?

5. In the Autumn, leaves fall from a particular tree. It's observed that on average, 3.1 leaves fall from this tree per minute. Explain why it is reasonable to model the number of leaves falling during a given minute as a Poisson random variable. What's the probability that exactly 5 leaves fall during a given minute? What's the probability that at most one leaf falls during a 3 minute span?

6. Two six-sided dice are rolled. Let the random variable X be their sum. Compute the expectation value, variance, and standard deviation of X.