Micah Cain

CS 215

Homework #6

CH 6.1

1. The probability of getting the ace of hearts in a five card poker hand is dependent on one card out of five drawn from a deck of 52 being the ace of hearts. It could be any one of the five cards, and the remaining four cards could be any other card. Thus, the probability is  
    C(52, 1) \* C(51, 4)/C(52,5).
2. This is a similar problem in that the desired hand will contain two specific cards. The total possible hands that meet this requirement would be C(52, 1) \* C(51, 1) \* C(50,3)/C(52,5)
3. Here the card value is specified, but not the suit. Therefore, we have four aces to choose from and 48 remaining cards to finish out the complete hand. There are 48 cards to choose from due to the fact that the other three aces are not available once an ace has been dealt. Therefore, the probability is:  
   C(4,1) \* C(48,4)/C(52,5)
4. There is only one winning combination of numbers for a given lottery. If the available numbers does not exceed 30, then the total number of ways to select six numbers is C(30,6). Thus, the probability of selecting the winning combination is 1/C(30,6)

CH 6.2

1. The formula for probability is the size of the event divided by the size of the sample space. The total number of permutations of the numbers 1, 2, and 3 is 3! or:  
   S = {123, 132, 231, 213, 321, 312} & |S| = 6
   1. The number of permutations in which 1 precedes 3 is 3. Thus, the probability is 3/6 or 1/2.
   2. The number of permutations in which 3 precedes 1 is also 3. Thus, the probability is again 1/2.
   3. The number of permutations in which 3 precedes 1 and 3 precedes 2 is 2. Thus, the probability is 2/6 or 1/3.
2. If we are to assume that the problem is asking for the number of 26 permutations in which the conditions are satisfied, then we must first determine the size of the sample space. The number of permutations of the 26 lowercase letters is 26!
   1. In order for the first 13 letters to be in alphabetical order, we must first choose a letter to start the permutation. After the first letter has been chosen, the remaining letters must be in alphabetical order, thus the next 12 letters in the permutation are essentially chosen after the first letter. Once the first 13 are chosen, there are 13 remaining letters. Therefore, the probability is C(26, 13) \* 13!/26!
   2. If we keep as a constant the letters a and z as the first and last letters of a permutation respectively, then the question becomes one of finding the probability of choosing 24 letters out of the remaining 24. Thus, the probability is 24!/26!