STAT414, Semester I 2009-2010

Assignment 1

(Deadline: 09/11/2009)

1. (Ex1.2) Two six-sided dice are thrown sequentiallu, and the face values that come up are recorded.

   (a) List the sample space.

   (b) List the elements that make up the following events: (1) A =the sum of the two values is at least 5, (2) B=the value of the first die is higher than the value of the second, (3) C=the first value is 4.

   (c) List the elements of the following events: (1) $A \cap C$, (2) $B \cup C$, (3) $A \cap (B \cup C)$.

2. (Ex1.4) Draw Venn diadgram to illustrate De Morgan's laws: (1) $(A \cup B)^c = A^c \cap B^c$, (2) $(A \cap B)^c = A^c \cup B^c$.

3. (Ex1.5) Let A and B be arbitrary events. Let C be the event that either A occurs or B occurs, but noth both. Express C in terms of A and B using only the basic operations of union, intersection, and complement.

4. (Ex1.12) In a game of poker, five players are each dealt 5 cards from a 52-card deck. How many ways are there to deal the cards?

5. (Ex1.16) How many different letter arrangements can be obtained from the letters of the word "statistically", using all the letters?

6. (Ex1.21) A fair coin is tossed five times. What is the probability of getting a sequence of three heads?

7. (Ex1.34) Prove the following identity:

$$\sum_{k=0}^{n} \binom{n}{k} \binom{m-n}{n-k} = \binom{m}{n}.$$

   (Hint: How can each of the summands be interpreted?)