MA381 Introduction to Probability

Instructions: This homework will be collected at the beginning of class Thursday, Dec. 3. Problems are to be done in order neatly. The pages are to be stapled together. Hw's not meeting these requirements will not be graded. Late hw's are not accepted.

Grading: Selected problems will be graded in depth; remaining problems will be awarded completion credit.

0: Be sure to read chapter 1, sections 1.1-1.4

1: Do problem 2, page 9

2: Do problem 5, page 9

3: Do problem 7, page 9

4: Prove De Morgan's second law, $(AB)^c = A^c \cup B^c$, using **either** an elementwise proof **or** by applying De Morgan's first law to A^c and B^c.

5: Suppose the experiment consists of tossing a fair 4-sided die twice. Do the following:

i. Let $(1, 1)$ denote the event that the die comes up 1 for both tosses. Using similar notation, list all outcomes/points in the sample space S.

ii. Let A be the event that the sum of the two tosses is even. Let B be the event that the sum of the two tosses exceeds 4. Answer the following:

1. Are A and B mutually exclusive?
2. Give the elements in $A \cup B$ and compute $P(A \cup B)$.
3. Give the elements in $A \cap B$ and compute $P(A \cap B)$.
4. Give the elements in A^c and compute $P(A^c)$.

6: Do problem 10 on page 24.

7: Let A_1, A_2, A_3, and A_4 be four events. Use the *Inclusion-Exclusion Principle* to express $P(A_1 \cup A_2 \cup A_3 \cup A_4)$ using sums involving terms of the form $P(A_i)$, $P(A_iA_j)$, $P(A_iA_jA_k)$, and $P(A_iA_jA_kA_l)$.

8: Classify the following probabilities as either objective or subjective:

i. Jill thinks the Colts have a 50-50 chance of Winning the Super Bowl this year.

ii. A group of physicists observed many spins of a roulette wheel in a gambling casino in order to determine if all the outcomes were equally likely. They did this because if the outcomes were not equally likely, then it would be possible to beat the house in the long run. This was in fact the case.