Exam 1 Review Sheet

Exam 1 in Sta 241 will occur on Tuesday, January 31. The exam covers the material we discussed from Chapter 2, all sections and Chapter 3, sections 2 - 3. Below is a copy of exam 1 from the Fall, 2010. Please note that this exam seems to have only covered chapter 2, it is highly recommended that you study the homework problems from Chapter 3.

Exam 1

[15 pts.] 1. Two events $A$ and $B$ are such that $P(A) = 0.2$, $P(B) = 0.3$ and $P(A \cup B) = 0.4$. Find the following:

a) $P(A \cap B)$

b) $P(\overline{A} \cup B)$

c) $P(\overline{A}|B)$
[10 pts.] 2. From a survey of 60 students attending a university, it was found that 9 were living off campus, 36 were undergraduates, and 3 were undergraduates living off campus. Find the number of these students who were

a) undergraduates, were living off campus, or both.

b) graduate students living on campus.

[10 pts.] 3. Three imported wines are to be ranked from lowest to highest by a purported wine expert. That is, one wine will be identified as best, another as second best, and the remaining wine as worst.

a) List the sample space.

b) Assume that the “expert” really knows nothing about wine and randomly assigns ranks to the three wines. One of the wines is of much better quality than the others. What is the probability that the expert ranks the best wine no worse than second best?


a) A group of three undergraduate and five graduate students are available to fill certain student government posts. If four students are to be randomly selected from this group, find the probability that exactly two undergraduates will be among the four chosen.

b) Two cards are drawn from a standard 52-card playing deck. What is the probability that the draw will yield an ace and a face card?

c) Five cards are dealt from a standard 52-card deck. What is the probability that we draw 3 aces and 2 kings?
5. Of the items produced daily by a factory 40% come from line I and 60% from line II. Line I has a defect rate of 8%, whereas line II has a defect rate of 10%. If an item is chosen at random from the day’s production, find the probability that it will not be defective?

6. Cards are dealt, one at a time, from a standard 52-card deck.

   a) If the first 2 cards are both spades, what is the probability that the next 3 cards are also spades?

   b) If the first 4 cards are all spades, what is the probability that the next card is also a spade?

7. Diseases I and II are prevalent among people in a certain population. It is assumed that 10% of the population will contract disease I sometime during their lifetime, 15% will contract disease II eventually, and 3% will contract both diseases.

   a) Find the probability that a randomly chosen person from this population will contract at least one disease.

   b) Find the conditional probability that a randomly chosen person from this population will contract both diseases, given that he or she has contracted at least one disease.

8. A football team has a probability of 0.75 of winning when playing any of the other four teams in its conference. If the games are independent, what is the probability the team wins all of its conference games?
9. A population of voters contains 40% Republicans and 60% Democrats. It is reported that 30% of the Republicans and 70% of the Democrats favor an election issue. A person is chosen at random from this population is found to favor the issue in question. Find the conditional probability that this person is a Democrat.

10. Suppose that $A \subset B$ and that $P(A) > 0$ and $P(B) > 0$. Show that

$$P(A|B) = \frac{P(A)}{P(B)}.$$