Stat 310 Exam 1 Review Comments

I am in the process of putting together your exam. Here are some of the ground rules. The exam will be take-home, open-book, open-note. You may not collaborate with others on the exam. I am targeting a 2hr exam. The exam will be available in class on Tuesday, and is due back in class on Thursday. Class Tuesday will be a review session, a la office hours or the Sunday afternoon sessions. On Tuesday, you may come in, pick up the exam, and go off and take it immediately, or stick around and ask questions. I will ask that if you know you just intend to pick up the exam and not stick around, that you do so at the very beginning of class (I do find it mildly distracting to have people leaving in the middle of class). The exam will be focused on the material that you have had homeworks on (ie, Chapters 1-4 with a few excluded sections that we didn't cover, such as 4.6). I also feel that I can ask you to make use of the central limit theorem for approximating the distribution of the sum of a large number of random variables. This is covered in Chapter 5. Keys to all of the homeworks (including hwk#5, due today) will be available on the web page, **http://www.stat.rice.edu/ kabagg/Stat310/index.html** as of this afternoon. If you have not yet turned in hwk#5, you may not look at the key until you do so. The problems on the exam will be roughly similar to homework problems with the following caveats. Some of the homework problems have asked you to repeatedly demonstrate knowledge of some concept; I will not be repetitive in that fashion. In the homework, that serves to drive home the concept, in the exam I just need to see that you've got the concept. The problems will not require MATLAB or extensive numerical computation for their solution. This does not mean that you should not have a calculator handy, as I might ask you to find the probability associated with a Poisson or binomial random variable taking on a specific value or two.

For the past two homeworks, I have indicated other "review" problems that you can look at to be sure that you understand how to set them up. Some other review problems (including stuff from earlier in the semester) are given below.

Chapter 1: 1, 4, 5, 11, 23, 27, 36, 37, 47, 49, 61, 68, 77.

Chapter 2: 1, 3, 12, 13, 15, 22, 27, 34, 38, 41, 46, 58, 59, 68.

Chapter 3: 7, 17, 33, 40.

Chapter 4: 5, 20, 25.

Chapter 5: 3, 13, 14, 16, 17.

Chapters 1 and 2 seem to be emphasized more, but that is an artifact of the fact that I did not recommend additional review problems earlier. I do not recommend *doing* all of these problems, but rather attempting to set them up and feeling that you have some idea of how to attack the problem. A list of useful terms and concepts (free association) is given below.

Adding probabilities; $P(A \cup B)$
Conditional Probability
Law of Total Probability
Bayes' Rule
Independence and the product rule (how is this a special case of the rule for general events, which need not be independent?)

Sampling with and without replacement
Binomial and multinomial coefficients
Random Variables
Some special types of RVs (see below)
pmfs, pdfs, cdfs.
How to get from f_X to F_X, and vice versa.
Functions of random variables, or how to find $f_Y(y)$ given that $Y = g(X)$ and that you know $f_X(x)$.
Sums of random variables.
Products of random variables.
Quotients of random variables.
joint densities, f_{XY}. factorization of the joint density if X and Y are independent.
marginal densities, f_X, f_Y.
conditional densities, $f_{X|Y}, f_{Y|X}$.
Expectations.
Linear property of Expectation.
Expectations of functions of random variables.
Mean, Variance, Covariance and Correlation.
Conditional Expectation.
Law of Total Expectation.
Moments of a distribution.
Conditional Moments.
Moment Generating Functions (MGFs).
How to get moments from an MGF, how to find an MGF.
MGFs of sums of independent RVs.
MGF of $a + bX$.
Central Limit Theorem.

Give an example of a Bernoulli random variable. What parameters characterize it? Is this a discrete or a continuous random variable? What is its pmf or pdf? What is its mgf?

Give an example of a Binomial random variable. What parameters characterize it? Is this a discrete or a continuous random variable? How is a binomial random variable related to a Bernoulli random variable? What is its pmf or pdf? What is its mgf?

Give an example of a Geometric random variable. What parameters characterize it? Is this a discrete or a continuous random variable? How is a geometric random variable related to a Bernoulli random variable? What is its pmf or pdf? What is its mgf?

Give an example of a Negative Binomial random variable. What parameters characterize it? Is this a discrete or a continuous random variable? How is it related to a geometric random variable? What is its pmf or pdf? What is its mgf?

Give an example of a Poisson random variable. What parameters characterize it? Is this a discrete or a continuous random variable? How is it related to a Binomial random variable? What is its pmf or pdf? What is its mgf?

Give an example of an Exponential random variable. What parameters characterize it? Is this a discrete or a continuous random variable? How is this related to a Poisson random variable? What is its pmf or pdf? What is its mgf?

Give an example of a Gamma random variable. What parameters characterize it? Is this a discrete or a continuous random variable? How is it related to an exponential random variable? What is its pmf or pdf? What is its mgf?

Give an example of a normal random variable. What parameters characterize it? Is this a discrete or a continuous random variable? How is it related to all of the random variables listed above? What is its pmf or pdf? What is its mgf?

Give an example of a uniform random variable. What parameters characterize it? Is this a discrete or a continuous random variable? What is its pmf or pdf? What is its mgf?