M341 Review for Final Exam 091
3:00 p.m. Tuesday December 15th
YOU MAY BRING ONE PAGE (front and back) (8.5 X 11) OF ***YOUR OWN HANDWRITTEN*** NOTES TO THE EXAM
In addition to counting as final exam score, the grade on the final exam (if higher than your lowest score on one of three hourly exams) will replace that low score.

Problems on Final:

1. A problem on:
Drawing a Venn Diagram representing sets and set operations (i.e. shade the set $(A \cup B)C^c$), and then calculating probabilities of sets using Complement, Inclusion-Exclusion, and Difference rules.

2. A problem on computing conditional probability using the general formula for P(A|B) (or the multiplication rule form of same) in a tree diagram form and then using Baye's Rule to compute the reverse tree probabilities. Review the problem on this on your first exam.

3. One or more problems that make sure you know how to count permutations and combinations -- recognizing when to use each.

4. One problem on computing the probability of a sequence of events using the law of multiplication (Section 3.2)

5. A problem that is modeled as a series of independent Bernoulli trials – e.g. computing number of successes in n Bernoulli trials (using Binomial distribution, geometric, and negative binomial random variables)

6. A problem modeled by the hypergeometric distribution (Sampling without replacemnt -- with two kinds of objects).

*7. A problem that involves a large number of trials that are independent and identically distributed and we are to compute probabilities of events for either Sum or Average of these. (Hence, you will be applying the Central Limit Theorem and using a table with Normal(0,1) distribution.)

8. Given a particular simple discrete distribution, calculate the mean, variance, and standard deviation.

9. Given a particular continuous distribution's density function, calculate the probability P (X is in B) for some interval or set B, the mean, variance, standard deviation.

10. Given a Poisson process, calculate probability involving:

- waiting time until first arrival or interarrival time.
- waiting time until the r'th arrival (for some r)
- number of arrivals in time t.

Example: Let customers arrive at a bank according to a Possion process with a mean interarrival time of 15 minutes. (Hence rate = _____.) Calculate the probability that at least 3 customers will arrive in one hour. Calculate the probability that waiting time for the first customer after 12:00 noon is at least 20 minutes. Calculate the probability that no customers will arrive during the first 10 minutes. Calculate the probability that the waiting time for the 4^{th} customer is at least one hour.

11. a) Find the discrete joint probability function for jointly distributed discrete random variables.   Then calculate the marginal distributions and determine whether the random variables are independent or dependent.

*   b) Calculate the covariance, and correlation, of the random variables.

12. “Electrical component problem” for independent devices connected in parallel and/or serial.

13. A problem involving computing probabilities for jointly uniform random variables on a region.

14. Given a continuous joint density function $f(x,y)$, compute:

a) P[(X,Y) is in some region B]

b) marginal densities f_x and f_y, and determine whether X and Y are independent.

c) E(X), E(Y),

* d) E(XY), Cov(X,Y), Corr(X,Y)