

**CALIFORNIA STATE UNIVERSITY, HAYWARD
STATISTICS DEPARTMENT**

**Statistics 6402 Graduate Probability II
Winter 2004**

Take Home Midterm 1

1. Pick one chapter from Ch.1 - Ch.5 from Suess&Trumbo. Print the chapter, read the chapter marking any obvious errors, and turn in the printed out chapter. Read the problems and solve one problem of your choice.
2. Read Ch.6 and Ch.7 from Suess&Trumbo, do problems 6.13, 7.2, 7.8, 7.11. Extra Credit, do problems 7.15, 7.16.
3. Read the paper, Elementary Uses of the Gibbs Sampler: Applications to Medical Screening Tests, by Suess, Trumbo, and Fraser, available on Blackboard, Gibbs.pdf. Go to the website for the paper and run the programs from the appendicies and print out the plots produced in the paper. Comment on the computer output. Re-run the analyses using $N = 500$ and $A = 16$. See

<http://www.sci.csuhayward.edu/statistics/Gibbs/>

4. From Ross, Ch. 1, do problem 39, Ch.2 do problem 77, Ch.4 do problem 24
5. Using jstor from the library website find a current research paper from a journal that uses MCMC modeling. Discuss briefly what the model is for and explain how the Markov Property is used in the model. Turn in the title of the paper and its author, along with a link to the paper in jstor.
Another possible online resource for statistics papers is Project Euclid or google scholar.

<http://projecteuclid.org/>

<http://scholar.google.com/>

6. Short Answer:
 - (a) Explain how the gambler's ruin problem can be used to compare two new drugs developed to treat a certain disease. Hint: See section 4.5.1 in Ross.
 - (b) Explain how a Markov Chain can be used to study the simplex algorithm for solving a linear programming problem. Discuss how Stirling's approximation is used and how the normal distribution is involved. Hint: See section 4.5.2 in Ross.
 - (c) Discuss how to show a Markov Chain is Time Reversible. Hint: See section 4.8 in Ross.