READ:
1. Trivedi – 7.7 – 7.8, 8.1 – 8.4

DUE DATE: Monday Nov. 29, 2004

PROBLEMS:

PROBLEM 1: Variable Arrival Rate Queuing System

(Cassandras, Problem 6.2) Consider a M/M/1 queueing system where customers are discouraged from entering the queue in the following fashion: While the queue length is less than or equal to $K$ for some $K > 0$, the arrival rate is fixed at $\lambda$; when the queue length is greater than $K$, the arrival rate becomes $\lambda_n = \lambda/n, n \geq K+1$. The service rate is fixed at $\mu > \lambda$.

• a- Find the stationary probability distribution of the queue length.
• b- Determine the average queue length and system waiting time at steady state.
• c- How far can you reduce the service rate before the average queue length becomes infinite?

PROBLEM 2: Machine Repairman Problem

(Gross & Harris, 2.44) Suppose that each of five machines in a given shop breaks according to a Poisson law at an average rate of one every 10 hours, and the failures are repaired one at a time by two maintenance men operating as two service channels, such that each machine has an exponentially distributed servicing requirement of mean 5 hours.

a- What is the probability that exactly one machine will be up at any one time?
b- If performance of the workmen is measured by the ratio of average waiting time to average service time, what is this measure for the current situation?
c- What is the answer to (1) if an identical spare machine is put on reserve?

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PROBLEM 3: Trivedi; Problem 2, Page 383

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PROBLEM 4: Trivedi; Problem 4, Page 421

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PROBLEM 5: Trivedi; Problem 1, Page 435

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PROBLEM 6: Trivedi; Problem 2, Page 443

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PROBLEM 7: Continue to work on the project. Exchange your work with that of the other groups. At this point each group should have completed enough of their work to begin separate integration activities of the input/parsing section with the simulation execution section. Each group should now separately integrate the two sections together and begin the debugging. Start with just everything being exponentially distributed, and use a simple text output. Develop a set of test cases that can be solved analytically. Additionally, use the system simulated in the earlier homework as another test case. Write a short (couple of paragraph) progress report and be prepared to present your progress report in class. In class, we will discuss just how we will proceed with developing the a) various distribution functions, b) the outputs (discrete data and curves).