

**Due in class on Tuesday, December 12th, 2006**

Queueing Network Models:

1. You are in the process of making decisions for a file server (similar to the one we discussed in class), which consists of a centralized CPU with several disks. On average, each request entering the system makes 10 disk requests, requiring 0.02 seconds of service time. Service time at the CPU between disk requests is on average 0.01 seconds. The average request arrival rate to the file server is 5 requests per second (you can assume requests are independent and identically distributed using an exponential distribution). What is the minimum number of disks you will need (assuming that requests are evenly distributed across disks) in order to keep the average response time below 0.5 seconds?
2. Assume instead of an arrival rate as above that you have a closed system, i.e., you have a fixed number of users (10 in this case), each of which think for 2 seconds between requests, and that your file server is fixed at 2 disks. What is your average response time in this case? What is your individual disk utilization? (Hint: You may find it easier to write a small program to generate your result. Please show your work in either case (i.e., show your program or how you derived the answer by hand).