

CS-470
Modeling and Simulation
Lab 3
Single Queue, Single Server

Date: March 30, 2001

Due: April 13, 2001

Use the random number generators developed from the first lab to program a single queue, single server simulation (a la the convenience store, ATM, or any other single server queuing system). Compute statistics that record the following metrics:

- Average number of customers in the system
- Average queue length
- Average service times
- Average waiting time (queuing and service)
- Server utilization

Make sure your simulations run long enough to demonstrate that a steady state condition has been reached (queues do not grow or shrink excessively). Use an exponential distribution to model service times and arrival rates. Make sure steady state is reached in each simulation before reporting the metrics above. Tune your distributions to bring the system to steady state.

As a verification step, compute what the expected values should be for traffic density, L_s , L_q , W_s , W_q , etc. Then, compare your measured values for these statistics to the expected values from Markov's formulas. If there are discrepancies, correct for them in your model and redo the simulation.

As always, make sure your lab report summarizes the approach you've taken to the problem, describes the implementation to adequate detail, and validates your results to test compliance with the objective.