>>> Assignment #4 for Simulation (CAP 4800) <<<
Due on 06/13/13 in class

This assignment covers material from the fourth week of class lecture.

Problem #1 (35 points)

Determine *X*, *Ts*, *U*, *W*, *Wq*, *L*, and *Lq* for the following single-server queueing system for the time period 0 to 150 seconds. Carefully show your work including all pertinent figures and formulas. **Hint:** Review your week #4 reading (MacDougall, Chapter 1).

- Arrival #1 at time = 10 seconds with service time = 20 seconds
- Arrival #2 at time = 20 seconds with service time = 30 seconds
- Arrival #3 at time = 35 seconds with service time = 10 seconds
- Arrival #4 at time = 80 seconds with service time = 120 seconds
- Arrival #5 at time = 100 seconds with service time = 20 seconds

Problem #2 (30 points)

Using the `mm1.c` simulation program we discussed in class (and that is available for download via the class website), simulate the following offered loads for an M/M/1 queue: 50%, 60%, 70%, 80%, 85%, 90%, 91%, 92%, …, 98%. Fix the service time to be 1.0. For each offered load collect results on the mean number of customers in the system (*L*). Use a SIM_TIME of 200000 seconds. Plot both the simulation results and theory results (based on the formula for *L* for M/M/1) on one graph. Plot a graph of relative error for simulation to theory versus offered load on another graph. Comment on the relative error. Does it stay the same for all offered loads?

Problem #3 (35 points)

Repeat problem #2 for M/D/1 (of course, you can't use the formula for *L* for M/M/1, you must use the P-K formula correctly). You will need to modify `mm1.c` to model an M/D/1 queue. In addition to the two plots, also submit your modified `mm1.c` (perhaps call it `md1.c`?) source code. Comments on the relative error – is it greater or smaller than for the M/M/1 simulation? Speculate on the "why".