CSCI 410: Modeling and Simulation

Written Assignment 1

Due September 12th, 23:59:59PM.

- 1. For the single-server queueing system in Section 1.4, define L(t) to be the total number of customers in the system at time t (including the queue and the customer in service at time t, if any).
 - (a) Is it true that L(t) = Q(t) + 1? Why or why not? If not, correct the right side of the equation. You may use the functions defined in Section 1.4.
 - (b) For the same realization considered for the hand simulation in Section 1.4.2, make a plot of L9t) vs. t (similar to Figs. 1.5 and 1.6) between times 0 and T(6).
 - (c) From your plot in part (b), compute $\hat{l}(6)$ = the time-average number of customers in the system during the time interval [0, T(t)]. Show the expressions for computation, mimicking Equations 1.2 and 1.3.
 - (d) What is $\hat{l}(6)$ estimating?
- 2. Suppose the list of interarrival and service times in Section 1.4.2 is augmented by the following items: $A_{10} = 0.6$, $A_{11} = 1.1$, $A_{12} = 1.5$, $A_{13} = 0.8$, $S_7 = 2.0$, $S_8 = 2.5$. Assume the simulation stops when the 7th customer leaves the system. Show the system state, simulation clock, event list and statistical counters as in Figure 1.7 after processing each even since simulation time of 8.6.
- 3. Suppose the simulation in section 1.4 stops at simulation time of 8.1. Show the system state, simulation clock, event list and statistical counters at the end of the simulation.
- 4. For the single-server queueing system in Section 1.4, suppose a customer leaves the system without being served after staying in the queue for 0.2 or more units of time.
 - (a) What new events must be introduced?
 - (b) Show the system state, simulation clock and event list after each event until the end of the simulation. The simulation finishes at simulation time of 9.0.