

Day #9 Exercise -- SOLUTIONS

1) What is a Monte Carlo simulation in one sentence (or less)?

“A simulation without a time component”

2) Sketch-out the general approach to a Monte Carlo simulation (hint: four steps). Try to do this from memory!

- 1) Define a domain of possible inputs
- 2) Generate inputs randomly
- 3) Perform a deterministic calculation using inputs
- 4) Aggregate results of individual computations into a final result

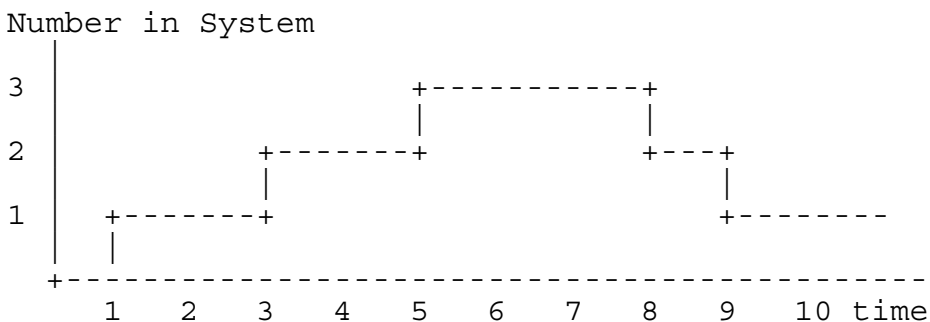
3) What are the component of a discrete-event simulation? Try to do this from memory!

System state, simulation clock, event list, event routines, statistical counters, library routines, report generator, initialization, main program

4) Consider the following single-server queueing system from time $t = 0$ to $t = 10$ sec. Arrivals and service times are:

- Customer #1 arrives at $t = 1$ and requires 3 seconds of service time
- Customer #2 arrives at $t = 3$ and requires 4 seconds of service time
- Customer #3 arrives at $t = 4$ and requires 1 second of service time
- Customer #4 arrives at $t = 5$ and requests 3 seconds of service time

Solve for system throughput (X), total busy time (B), mean service time (T_s), utilization, (U), mean system time (W), and mean number in the system (L). You must show your work to receive credit!



$$X = C/T = 3/10 = 0.3333 \text{ cust/sec}$$

$$B = 9 \text{ seconds}$$

$$T_s = B/C = 9/3 = 3 \text{ sec/cust}$$

$$U = B/T = 9/10 = 0.90 \text{ or } 90\%$$

$$W = \text{Sum of } w / C = 18 / 3 = 6 \text{ sec}$$

$$L = \text{Sum of } w / T = 18 / 10 = 1.8 \text{ customers.}$$