

IE 306 – Fall 2023

Homework 3

Due date: Thursday, December 14 (17:00)

Students arrive at a canteen, where they join a single queue to receive service by one of two food servers, then join another queue, pay a single cashier and leave. There are two types of students: For engineering students, interarrival times are Normal(5,1) minutes; for social sciences students, interarrival times are Exponential with mean 4 minutes. Food service times for engineers' requests are Uniform(2, 7) mins. Food service times for social scientists' requests are Exponentially distributed with mean 5 minutes. After food service, students proceed to pay the cashier. Independent of student type, 60% of the students pay with credit card, whereas the rest pay cash. Credit card payments take $U(1.0, 2.0)$ mins and cash payments take $U(2,6)$.

But right after paying, 25% of students realize that they forgot their drinks, go & get their drinks, rejoin the cashier queue and occupy the cashier for another minute. Getting this forgotten drink is assumed self-service and the time it takes is about 0.5 minutes. The drink-forgotters are processed first even if there are other people waiting in the queue.

Every 3 hours, one of the food servers go out for a break of exactly 15 minutes. When it is time to take a break, either the idle cashier or the one who finishes serving the customer first takes the break.

Write a SIMAN program that simulates this system for 8 hours, with 4 replications. The model should estimate the following;

- the average queue lengths,
- the average time spent in the first queue,
- utilization of each server, by student type, and
- the number of students who forgot their drinks, by student type.

Hand in your model block diagram, its program listing and its output(s).

NOTE: Your program must have some minimum documentation (with comment lines).