**CS 255: Computer Science II Spring, 2022**

Assignment #12

Worth: 30 Points

Write a C++ program to simulate the check-out lines at a grocery store. The queue should be implemented using a circular-based array. Your program should accept five **command-line arguments** as follows:

a.exe duration expectedarrival servicetime numberofqueues verbosemode

For example, a call of:

a.exe 60 1.8 4.2 3 1

would mean:

1. The simulation would run for 60 minutes.
2. Every minute, an average of 1.8 customers would look to check out (based on Poisson distribution with a minimum of 0 customers arriving).
3. The average time to check out would be 4.2 minutes (based on Poisson distribution with a minimum check-out time of 1 minute).
4. There would be 3 lines (queues) open for check-out.
5. Verbose mode is on (1=on, 0=off). Verbose mode means that clock ticks would be displayed, along with all activity (new customers looking to check out, customers that have finished checking out). In either case, final summary statistics (mean wait time, maximum wait time) should be displayed.

If the program does not provide the correct number of arguments, or the values are not valid, an appropriate message should be displayed, and the program should simply exit.

Sample output for the program should look something like this:

Minute 0:

Minute 1: Bob arrives with 4-minute service time

Bob enters queue #1

Bob begins service

Jane arrives with 2-minute service time

Jane enters queue #2

Jane begins service

Minute 2: Steve arrives with 9-minute service time

Steve enters queue #3

Steve begins service

Sally arrives with 5-minute service time

Sally enters queue #1

Minute 3: Dave arrives with 5-minute service time

Jane exits queue #2

...

MEAN WAIT TIME: XX.X MAXIMUM WAIT TIME: XX

**What to turn in:**

* A single Word document that includes the following pieces, all clearly labeled:

1. A sample run of your program with the input given above.
2. Sample runs with all parameters fixed except the number of queues (verbose = off).
3. Another sample run with all parameters fixed except the number of queues (verbose = off).
4. A couple of paragraphs observing and analyzing the data from your two experiments in parts (c) and (d).

* A zipped file of your source code (ONLY INCLUDE .h and .cpp files)