

Materials to be submitted in a single zipped file: (1) Source code of the simulation program. (2) Simulation report, including simulation input, simulation output, statistics calculated from the output, the analysis, and the conclusions.

### **Simulation report:**

I ran this simulation a total of 5 times with the following results:

#### **Run 1:**

**\* Two-server queueing system with fixed run \***

**Mean Inter arrival Time: 3**

**Mean Service Time: 5**

**The End of Simulation Time: 480**

**Total Flow Time: 699.69**

**Total Waiting Time in Queue: 427.88**

**Average Waiting Time (Delay) in Queue: 1.91018**

**Average Flow Time: 3.12362**

**Number of Completed Customers: 224**

**Average Number of Customers In System / Unit Time: 0.465613**

**Program ended with exit code: 0**

#### **Run 2:**

**\* Two-server queueing system with fixed run \***

**Mean Inter arrival Time: 3**

**Mean Service Time: 5**

**The End of Simulation Time: 480**

**Total Flow Time: 647.36**

**Total Waiting Time in Queue: 368.236**

**Average Waiting Time (Delay) in Queue: 1.9179**

**Average Flow Time: 3.37167**

**Number of Completed Customers: 192**

**Average Number of Customers In System / Unit Time: 0.396964**

**Program ended with exit code: 0**

**Run 3:**

**\* Two-server queueing system with fixed run \***

**Mean Inter arrival Time: 3**

**Mean Service Time: 5**

**The End of Simulation Time: 480**

**Total Flow Time: 827.514**

**Total Waiting Time in Queue: 508.777**

**Average Waiting Time (Delay) in Queue: 2.38862**

**Average Flow Time: 3.88504**

**Number of Completed Customers: 213**

**Average Number of Customers In System / Unit Time: 0.443005**

**Program ended with exit code: 0**

**Run 4:**

**\* Two-server queueing system with fixed run \***

**Mean Inter arrival Time: 3**

**Mean Service Time: 5**

**The End of Simulation Time: 480**

**Total Flow Time: 573.454**

**Total Waiting Time in Queue: 312.733**

**Average Waiting Time (Delay) in Queue: 1.55588**

**Average Flow Time: 2.853**

**Number of Completed Customers: 201**

**Average Number of Customers In System / Unit Time: 0.418603**

**Program ended with exit code: 0**

Run 5:

**\* Two-server queueing system with fixed run \***

**Mean Inter arrival Time: 3**

**Mean Service Time: 5**

**The End of Simulation Time: 480**

**Total Flow Time: 647.36**

**Total Waiting Time in Queue: 368.236**

**Average Waiting Time (Delay) in Queue: 1.9179**

**Average Flow Time: 3.37167**

**Number of Completed Customers: 192**

**Average Number of Customers In System / Unit Time: 0.396964**

**Program ended with exit code: 0**

Assuming normal distribution,

Ave\_delay = [1.9179, 1.55588, 2.38862, 1.9179, 1.91018]

$\mu = 1.94$

$\sigma^2 = 0.0877$

the 90% confidence interval then is: [1.722, 2.16] // z-value = 1.645

**Conclusion:**

So, the customers are happy!