Assignment 1 – Written Responses

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Problem 1 (Law 1.9)

After replicating the data 10 times, we find that the average delays range from the high end of .3 minutes to .5 minutes. On average, the average delay in the queue was just under half a minute (~.461 minutes), which is very close to both the average number in queue (~.464) and the server utilization (~.49).

While the average number in queue and the server utilization both seem directly proportional to the average delay, the average number in queue has a very high correlation while the server utilization is only closely related. Additionally, the “Time Simulation Ended” data appears to be inversely proportional to the average delay in the queue. The evidence that points to this is a scatterplot that I made in excel to analyze the data.

Problem 3.2

There are a lot of differences between the 2 runs. Some of the biggest differences are the average delay for the queue for server 2, which is typically 160x larger than the original run. Another difference worth noting is that the server utilizations are up for both servers from running about ~65% of the time to running at full speed nearly the entire time. I expected the utilization to increase for server 2, but I am surprised by the increase for server 1.

Problem 3.3

The only changes I made to the program between the original 1.14 and the modified version, was increasing the Q\_LIMIT from 100 to 2500. This allowed the modified simulation to run without any issues, but it did increase the data usage by quite a bit.