CSE 12 Homework 6
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Section [8:00 and 10:00]
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1. What happens (in terms of the statistics you measured) when your mean time between arrivals is greater than or equal to your service time in the fixed (non-random) case? Explain why this is.

   For non-random case if the mean time between arrivals is greater than or equal to your service time for fixed case. There will be no average wait time nor max wait time but a maximum wait queue of 1. This is because the arrival per customer is slower than the service time.

2. What happens when your mean time between arrivals is much greater than your service time in the variable (random) case? Explain why this is.

   For random case if the mean time between arrival is greater than or equal to your service time. the will be a normal distribution. It starts off with some average time and then it reaches a peak. Afterwards, there will be no queue time, wait time nor maximum wait time. This is because Customers can come at random times but average a mean of arrival time. As the mean time Increases there will be no wait time.

3. What happens when your mean time between arrivals is equal to your mean service time in the variable (random) case? Explain why this is.

   For random case if the mean time between arrivals is equal to your service time for random case. For a sample case of customer of 5, arrival time of 3 and service time of 3. The average time, maximum wait time and queue length seems to be increased for this sample size. This is because Of the seed and also the fact that there is a larger distribution for the random generator to generate its arrival time and service time.

4. What happens when your mean time between arrivals is less than or equal to your mean service time (in either case)? Explain why this is.

   The average of waiting time will be increasing, maximum time and the maximum wait queue will be increasing when the mean time between arrivals is less than or equal to the service time in the fixed (non-random) case because the time of arrivals is faster, which means more people will come as time is going.

   With the sample size of five, with the arrival time of 3 and service time of 3. As arrival time decreasing, the same thing will happen similar as the fixed case. But when arrival time is the same as service time, the average time, maximum time and queue length will be at random. The reason that this will happen is because when the number is less than 3, it has a smaller distribution for the random generator to generate. However when it is equal to 3, the generation distribution will be larger. Therefore, the average time, maximum time and service time will increase.

5. Finally, in your experiments above you were using a simple Queue for the wait queue where customers are served in the order in which they got in the line. But what happens if you change the wait queue to a priority queue where Customers with smaller service loads are moved to the

front of the wait queue? Make this change to your code now, and rerun one of your experiments above (with the same random number seed) and compare your results.

When there are five customers, the average wait time is 3 hours, the maximum wait time is 6 hours, and the maximum queue length is 3. When we change the wait queue to a priority queue where Customers with smaller service loads are moved to the front of the wait queue, the average wait time change to 1.8 hours, the maximum wait time is 6 hours and the maximum queue length is 2. The average wait time is decreasing, but the maximum wait time and the maximum queue length are the same. Service load comes first.

NOTE: When you change your wait queue to a priority queue (HeapPQ12), you will also need to change the Customer class so that it implements the Comparable interface.