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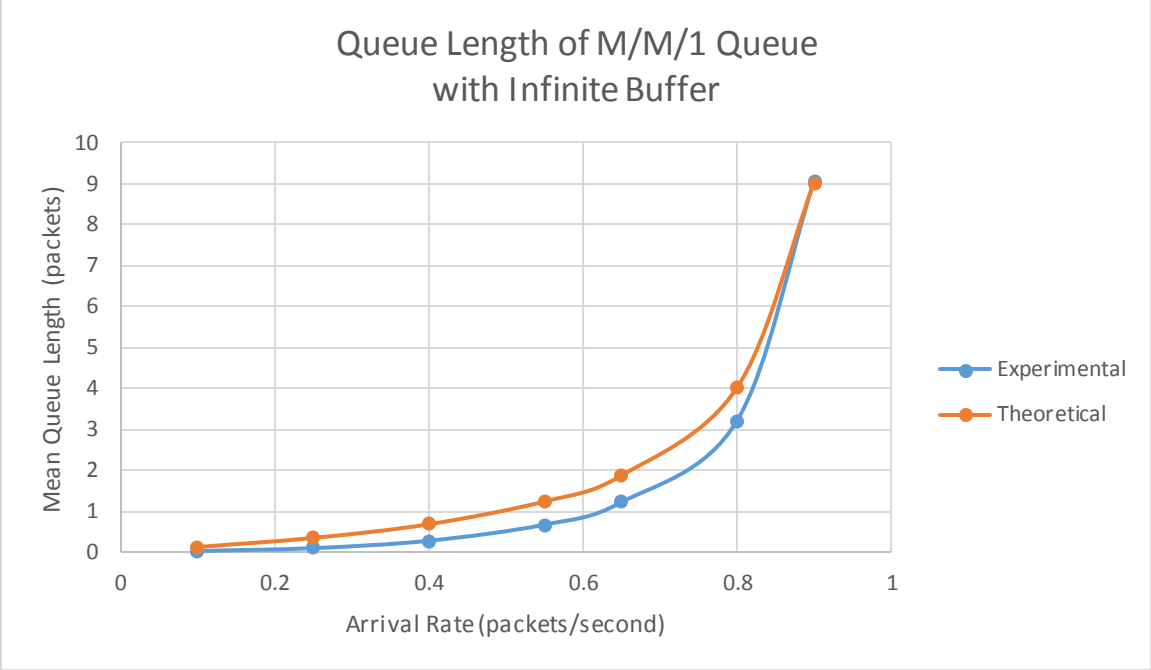
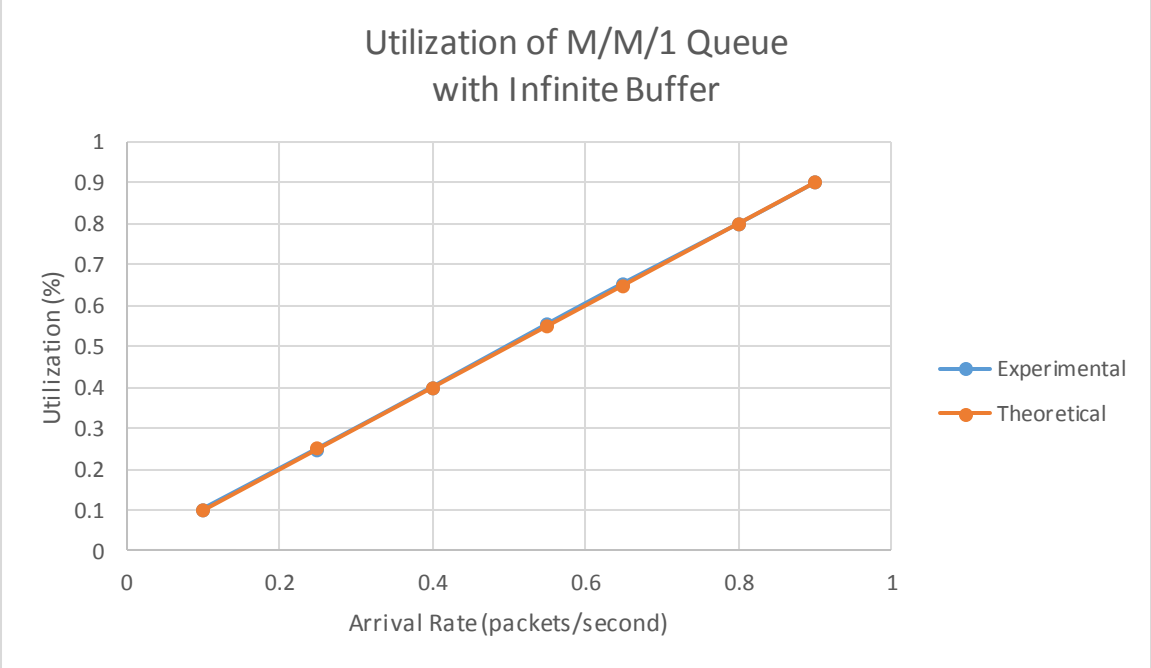
ECS 152A Project Phase 1

3.7 Expirments

1. **Assume $\mu = 1\frac{pakets}{second}$. Plot the queue length and the server utilization as a function of λ for $\lambda = 0.1, 0.25, 0.4, 0.55, 0.65, 0.8, 0.9\frac{packets}{second}$ when the buffer size is infinite.**





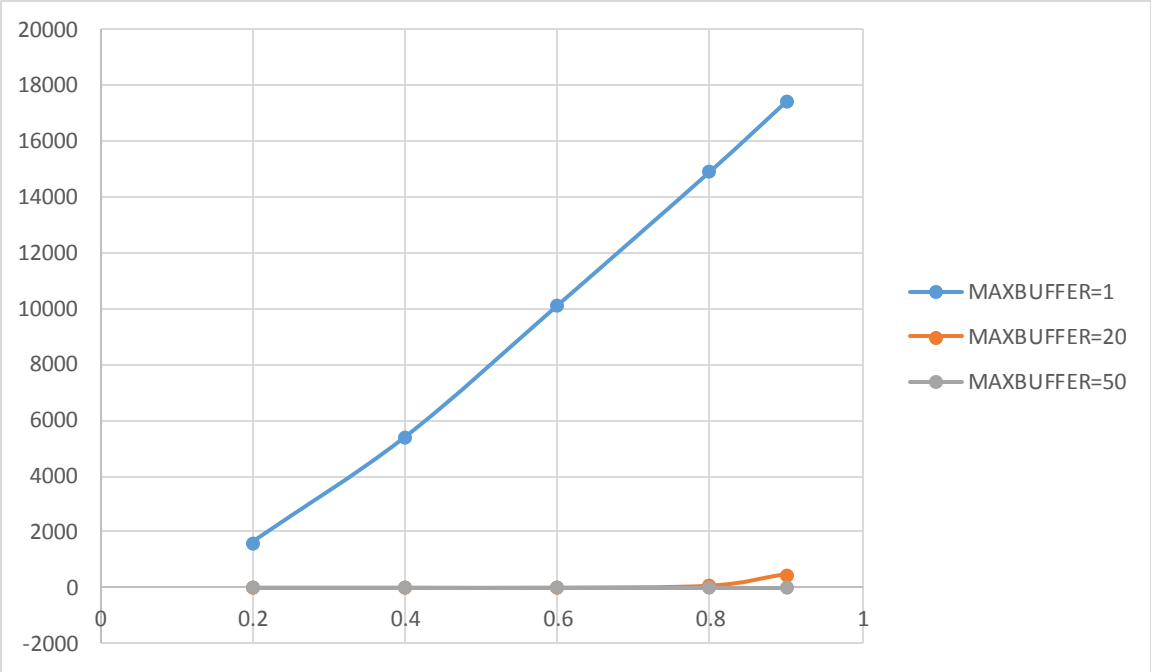
2. **Mathematically compute mean queue length and the server utilization and compare with the simulation results (The mathematical formulation will be discussed in class).**

   The mean length of an M/M/1 Queue with infinite buffer size is given by $\frac{\rho}{(1-p)}$, where $\rho = \frac{\lambda}{\mu}$.

   The mean utilization of an M/M/1 Queue with infinite buffer size is given by $\rho = \frac{\lambda}{\mu}$.

   (Refer to *Super Cool Enhanced Graphs* above).

   Our data matches the theoretical results fairly well. Both show that the arrival rate has an increasing effect on queue length as it approaches the departure rate. Both also show that utilization is roughly linear with the ratio between arrival rate and departure rate.

3. 

   As is shown, the size of the buffer has a significant effect on the number of packets dropped. Having a larger buffer significantly reduces the number of packets dropped, simultaneously increasing the necessary arrival rate before any packets are dropped.