BS213 _simulation

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Midterm Projects

Pick one question. If you would like to change any of the parameters, please explain how and why you are changing them. Also please explain any parameters that you are simulating. You will be required to show your code and your results in class.

1) Assume that banks open at 8am and close at 5pm. Customers arrive at the bank at a rate of 4/hr. Between the hours of noon and 1 that rate increases to 6/hr. Suppose we have 3 tellers each with their own rate of service. Teller 1 has rate G1 which is exponential with rate 6, Teller 2 has rate G2 ~ exponential with rate 5, Teller 3 has rate G3 ~ exponential with rate 4. We have studied 3 types of queueing systems 1) 1 line with parallel servers. 2) tandem service (DMV example) and 3) where each teller has their own line (grocery store). Given three tellers which queueing system has the shortest expected waiting time for the customers?

2) Toys R U has heard that 1 of a possible 3 toys will be the "hot" toy this season. Customers will appearing and demanding the hot toy according to a Poisson process with rate lambda. You can assume that customers who want the toy come into the store starting November 8, 2002 at a rate of 10 per day. As time gets closer to Dec. 24th, the rate increases. The manger must keep an amount of the toy in stock in order to meet this demand. Suppose they use the (s,S) inventory system. That is, if the stock on hand of the hot toy, x, becomes less than s, S-x of the toys will be ordered. The cost of ordering the hot toy is: c(y)= 20y + t. It takes L units of time for the toy to be delivered, in this case L=10 days. The shop pays an inventory holding cost of $1 per toy/per day. Each customer is willing to pay an amount for the hot toy. This is an independent random variable g, which is distributed G (which only has values on the positive real line). If the price of the toy, r, is less than g, r <= g, then the customer will buy the toy, if r>g , the customer will not buy the toy. Suppose that the manger knows G (g ~G). What should the price of the hot toy be and what should the inventory strategy (s, S) for each toy, given that we want to maximize profits. Note that T= December 24, 2002.

If you want to do number 2 and are having difficulty, you can set r to be =$50 and assume that there is a .50 probability that any given customer will purchase the toy. That is you do not have to simulate G. But only do this if you are really having trouble.