23/3/24

Midterm Simulation

The code does take some time to run. You can decrease the range of M to make it run faster and decrease the step in the for loop for a more accurate result.

I initialize all the variables that are constants like the customer arrival rate, cost per pretzel, selling prices of pretzels, etc.

Then, I create a user defined function that simulates the arrival of customers and the sales process by taking the parameter - M= number of pretzels ordered as the input. I reinitialize pretzels_left and assign the value of "M" to it for better

readability of the code.

Along with that, I initialize total_revenue and lost_revenue as well.

For every minute in the duration of the business in a day, I generate the number of customers based on the poisson distribution.

For every customer, I generate the order based on the probabilities given in the question.

If the pretzels left is zero, I increment the sale that would have been made in the lost_revenue else, I find the minimum of the pretzels left and the order type and make the sale. This is done in case there isn't enough pretzels to

satisfy the order.

Since the pretzels ordered can be zero if there is no stock left, the sale is made and the total revenue is incremented only when it is more than zero.

At the end of the day, the left over pretzels are sold and added to the total revenue. The profit is calculated and returned along with the pretzels left.

For a range of "M" values, I initialize two lists - profits and leftovers, to store 50 days' worth of profits and leftovers and find

the average.

For a range of M, we compute the profits and left overs for a range of days, and append them to the list and find its avg. We store the results in a dictionary where "M" is the key and the avg. profits and avg. leftovers are the values.

We find the best value of "M" based on the highest profit made and print them.

The optimal results I got was M = 2770 with profit = 1252 and leftover = 50.

I got different values everytime I ran the code and the range was approximately,

$$2700 \leq M \leq 2900$$

$$1100 \leq \text{Profit} \leq 1254$$

$$0 \leq \text{Leftover} \leq 50$$