DSCI 216: Stochastic Computing
Project #3
24-Nov-2021@11:59:59pm
Total: 100 points

Goal

In this project assignment you will employ MATLAB's sampling routines to answer the following questions. You may collaborate with a colleague in the course. If you collaborate, please identify your collaborator.

Burritos at Fall Open House


chicken beef

Once again, it is fall open house at Clark University! As part of open house festivities at Computer Science, lunch will be provided (this is hypothetical). Dr. Magee was able to arrange a discount on Burritos from Hacienda Don Juan, a local family owned Mexican/Salvadoran restaurant in Worcester.

According to the National Chicken Council (yes it is a thing), the US national consumption of chicken is twice that of the consumption of beef. A chicken burrito costs Dr. Magee $3.00, while a beef burrito costs $4.00. Dr. Magee is planning to purchase either a chicken or beef burrito for each visitor. As he does not know the preference of each person, he must ask. There are a total of 100 attendees for open house and he asks each to fill in a web form to submit his or her burrito choice, namely chicken or beef. Help Dr. Magee figure out how much it will cost to buy lunch for all the students in the department.

1. On average, how many students will order a chicken burrito? A beef burrito? Simulate , show your work, and write discussion. (**10 points**)

2. On average, how much money will Dr. Magee spend?
   Simulate, show your work, and write discussion. **(10 points)**

Cougar Eats Returns!

Fresh of its success from exam#1, Cougar Eats has decided to sell a Clark University inspired box meal at Worcester Woo Sox games! The Cougar box meal consists of a fish sandwich, waffle fries, and a beverage all for the low price of $6.00. For each box sold, $1.00 goes to the Clark student emergency scholarship fund. Cougar Eats has recruited you to help them figure out how many employees they can afford to hire to work during the promotion.

The WooSox organization has data on the average number of customers that visit a food truck for each hour of operation. They anticipate the same customer traffic for Cougar Eats. Assume a WooSox game lasts 4 hours.

The following average number of customers visit a food truck during a WooSox game

- 1st hour of operation: 100 customers visit the truck
- 2nd hour of operation: 200 customers visit the truck
- 3rd hour of operations: 400 customers visit the truck
- 4th hour of operations: 100 customers visit the truck

Answer the following questions using two approaches (1) modeling the entire 4 hours using a single distribution (simple model) and (2) modeling the 4 hours using multiple distributions (complex model), one for each hour of operation.

3. What is the average amount of revenue Cougar Eats will collect during a game? What is the average amount of money Cougar Eats will donate to the Clark student emergency scholarship fund resulting from a game? Simulate, show your work, and write discussion. **(10 points simple, 10 points complex)**

4. It costs Cougar Eats $15.00/hour for a single employee. Given the revenue Cougar Eats collects and the amount of money they donate, how many employees can Cougar Eats hire if they must keep half the money they collect in order to be profitable? Simulate, show your work, and write discussion. **(10 points simple, 10 points complex)**

5. Compare the results of your simple model and complex model. Do your results change as you increase the number of trials used to calculate your results? Simulate, show your work, and write discussion. **(10 points).**

Baseball Practice

Baseball legend David "Big Papi" Ortiz of the Boston Red Sox had a .315 batting average in his final season. As a veteran of the game, key to keeping his performance at a high level, Mr. Ortiz spent hours in practice receiving pitches.

Always the competitive sort he would wager with his pitcher on the practice squad. The pitcher would throw pitches until Mr. Ortiz hits the ball. For each pitch he missed, Mr. Ortiz paid the pitcher $50. When Mr. Ortiz hit the ball, the pitcher paid Mr. Ortiz $75. Mr. Ortiz continued practicing with the pitcher until he hit the ball 10 times.

6. On average, how many pitches will Mr. Ortiz take for a single hit? Simulate, show your work, and write discussion. **(10 points)**

7. How much money on average will Mr. Ortiz win/lose during a practice? Simulate, show your work, and write discussion. **(10 points)**

8. Describe Mr. Ortiz's winnings as a function of batting average from 0.0 to 1.000. When does Mr. Ortiz lose money? When does Mr. Ortiz break even? Simulate, show your work, and write discussion. **(10 points)**

Submitting your work

1. Create a folder `FirstNameLastNameProj3`
2. Populate folder with all of your MATLAB experiments and written work
3. zip your folder
4. submit via. Moodle