Project 2 write up

In our program we start by setting up the simulation. First, we create a function called simulation with four input parameters, the cost and location of A1 and A2. We then determine the customers location by a random number between 0 and 10. We then find the distance between the customer and the cafés by finding the absolute value of the customers location – the location of the cafe. Then we calculate the scores using the formula in the video and assign each cafes score to separate variables. Then using the max() function we determine the best score and also determine the total score by adding them together. The best score and total score are then both assigned to separate variables. Next, we calculate the probability the customer chooses each store by dividing the restaurants score over the total score. These probabilities are stored as variables called prob\_(store number). Then we have to determine which store the customer chooses. We do this by first creating a random number from 0, 1, we call this variable choice. We then use the following formula: if the choice is less than the prob\_A1 then the customer chooses A1 and simulation returns our profit which is the cost of A1 – 2 since 2 dollars is the price it takes to make the coffee. If the choice is greater than or equal to prob(A1) and less then prob(A1)+ prob(A2) then simulation returns the profit again. If choice is greater or equal to prob(A1)+ prob(A2) and less then prob(A1) + prob(A2) + prob(B1) then the customer chooses B1 and we get no profit so simulation returns 0. We then end this formula by an else statement where the customer chooses B2 and the simulation returns 0 also. These if statements assign the probabilities into a section of choice possibilities. By doing this we can accurately create a realistic outcome for what store the customer chooses based on the probabilities of the stores. We now create a new function called run\_simulation with no parameters. In run\_simulation we create a while loop that runs 10,000 times. This while loops picks random prices (between 2 and 6) and random locations (between 0 and 10) for both A1 and A2. Each of these numbers are added together, in string from, to create the combined\_numbers variable. And then we add combined\_numbers as the key term in a dictionary called profit\_dict and set its value to the previous simulation run with the numbers that we just generated. This while loop creates a dictionary with the results of the simulation ran with every number. We then find the best combo by using the max function on the profit\_dict and we return the CA1, CA2, LA1, and LA2 that got us the best profit. Now we create a new function called average\_profit that finds the average profit by running the simulation using the best numbers 100000 times. We now add up the total of these results and divide by 100000 to find the average profit. Then at the end there is a while loop that runs until we find a better combination. Our recommended values are CA1: 5.999999726310698 CA2: 3.5836539558225975 LA1: 6.553158864749928 LA2: 6.667531912137613 with these values we get a profit of 3.9999997263106977. For this project Max Beam completed Part 2 and this write up, Giovanna Barsalona did Part3 and Part1, Benjamin Canfield completed Part 4, and Sean Tucker completed nothing and didn’t communicate with us at all.