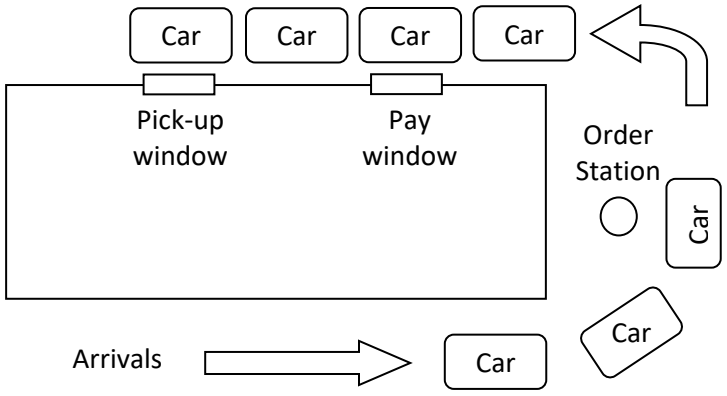
CS 4830/6830
Project 2

For your second programming assignment, you will study how to model and simulate input distributions. Since you already have experience simulating a simple queuing system, we will use the McDonald's Restaurant across the street from Wright State as our source of data. The restaurant has a single order station, a payment window, and a pick-up window. This matches the first scenario you develop for programming project 1.

This restaurant has the following layout:



Your tasks are to:

Use real data to model the arrival pattern to the order station, the time it takes to place an order, the time it takes to pay, and finally the time to pick-up food and exit.

To accomplish this task, you will use real data collected by students who took CS 4830/6830 in the Spring semester of 2020. The students were asked to observe the McDonald's restaurant on Colonel Glenn Hwy in early February 2020. The students were asked to collect data over a short time interval (~20 minutes) at some time between 11:30 AM - 12:30 PM and/or 5:30 PM - 6:30 PM on Monday-Friday. The students were asked to measure the time between successive arrivals of customers to the order station. Also, the students were asked to measure the time it takes to pay for the food and pick-up the food.

When you review the student's data sets, you will notice that some students did not follow the instruction. In some cases, they did not collect the data on the days or during the periods' request. In some cases, students collected start/stop times while other students collected time intervals. Some students noted problems with certain samples. You will need to determine what data sets to include in your analysis and what data to reject. Make sure to include an explanation for your choices in your report.

Once you have chosen your data sets, your task is to select distributions to characterize the arrival, order, payment, and pick-up pattern of this system. Make sure to justify your choice of distributions by conducting goodness of fit tests of the distributions to the real data.

Finally, test your model to determine if it is a behaviorally valid representation of the McDonald's restaurant during a busy period of operation by comparing the output of your simulation to the real data.

You may work as teams of two on this project. On the assignment due date, each team should submit a report discussing the results of their simulation. The report should focus on the analysis of the measured data, choice of distributions/parameters, and validation tests. Also, discuss your confidence in your recommendations using proper statistical techniques.

Appendix

The students were asked to collect the following information.

Date data was collected
Time data was collected (start - end)

For arrival data:

11:48:20
11:48:30
11:48:55
11:49:00
etc.

For the order, payment, pickup stations:

Arrival	Depart
11:49:20	11:50:35
11:49:50	12:00:45
12:02:00	12:03:35
12:04:52	12:06:27

etc.

Each team was asked to provide four data files contain approximately 20 minutes of measurements. These files are labeled as follows:

Arrival.csv
Order.csv
Payment.csv
Pickup.csv