CS544 Module 4 Assignment

General Rules for Homework Assignments

- You are strongly encouraged to add comments for the code portions. Doing so will help your instructor to understand your programming logic and grade you more accurately.
- You must work on your assignments individually. You are not allowed to copy the answers from the others.
- Each assignment has a strict deadline. If there is a delay, you must be in touch with the instructor and TA.
- When the term *lastName* is referenced in an assignment, please replace it with your last name.

Using R, do all of the following parts.

Part1) Binomial distribution (15 points)

Suppose a pitcher in Baseball has 40% chance of getting a strike-out when throwing to a batter. Using the binomial distribution,

a) Compute and plot the probability distribution for striking out the next 4 batters.
b) Plot the CDF for the above
c) Repeat a) and b) if the pitcher has 80% chance of getting a strike-out.
d) Infer from the shape of the distributions.

Part2) Binomial distribution (15 points)

Suppose that 70% of the buses arrive on time at Kenmore station.
Using the binomial distribution, answer the following.

a) What is the probability that five bues will arrive on time among the next b12 uses?
b) What is the probability that five or fewer buses will arrive on time among the next 12?
c) Compute the probability distribution for bus arriving on time for the next 12 buses.
d) Show the PMF and the CDF for the next 12 buses.

Part3) Poisson distribution (15 points)

Suppose that on average 9 cars drive up to the teller window at your bank between 3 PM and 4 PM and the random variable has a Poisson distribution. During this time period,

a) What is the probability of serving exactly 6 cars?
b) What is the probability of serving at least 6 cars?
c) What is the probability of serving between 3 to 6 cars (inclusive)?
d) Calculate and plot the PMF for the first 20 cars.

Part4) Uniform distribution (20 points)

Suppose that your exams are graded using a discrete uniform distribution between 60 and 100 (both inclusive). All grades are integers.

a) What is the probability of scoring i) 60? ii) 80? iii) 100?
b) What is the mean and standard deviation of this distribution?
c) What is the probability of getting a score of at most 70?
d) What is the probability of getting a score greater than 80?
e) What is the probability of getting a score between 90 and 100 (both inclusive)?

Part5) Normal distribution (20 points)

Suppose that customers at a store spend an average of $60. Assume that the money spent is normally distributed with a standard deviation of $6.

a) Show the PDF plot of this distribution covering the three standard deviations on either side of the mean.
b) What is the probability that a randomly selected visitor will spend less than $20?
c) What is the probability that a randomly selected visitor will spend between $20 and $50 (inclusive)?
d) Between what two values will the middle 80% of the money spent fall?

Part6) Exponential distribution (15 points)

Suppose AT&T customer support receives calls at the rate of **20 per hour**.

a) What is the probability that the next call will arrive within 3 minutes?
b) What is the probability that the next call will arrive between 3 minutes and 6 minutes (both inclusive)?
c) Show the CDF of this distribution.