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. Assignments submitted after the deadline would be penalized.

- When the term *lastName* is referenced in an assignment, please replace it with your last name.

Part1) Binomial distribution (20 points)

Suppose a pitcher in Baseball has 50% chance of getting a strike-out. Using the binomial distribution,

a) Compute and plot the probability distribution for striking out the next 6 batters.
b) Plot the CDF for the above
c) Repeat a) and b) if the pitcher has 70% chance of getting a strike-out.
d) Repeat a) and b) if the pitcher has 30% chance of getting a strike-out.
e) Infer from the shape of the distributions.

Part2) Binomial distribution (15 points)

Suppose that 80% of the flights arrive on time. Using the binomial distribution,

a) What is the probability that four flights will arrive on time in the next 10 flights?
b) What is the probability that four or fewer flights will arrive on time in the next 10 flights?
c) Compute the probability distribution for the next 10 flights.
d) Show the PMF and the CDF for the next 10 flights.

Part3) Poisson distribution (15 points)

Suppose that on average 10 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 3 cars?
b) What is the probability of serving at least 3 cars?
c) What is the probability of serving between 2 and 5 cars (inclusive)?
d) Calculate and plot the PMF for the first 20 cars.

Part4) Uniform distribution (15 points)

Suppose that your exams are graded using a uniform distribution between 60 and 100.

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 (use the lower.tail option)?
e) What is the probability of getting a score between 90 and 100 (inclusive)?

Part5) Normal distribution (20 points)

Suppose that visitors at a theme park spend an average of $100 on souvenirs. Assume that the money spent is normally distributed with a standard deviation of $10.

a) Show the PDF 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 more than $120?
c) What is the probability that a randomly selected visitor will spend between $80 and $90 (inclusive)?
d) What are the probabilities of spending within one standard deviation, two standard deviations, and three standard deviations, respectively?
e) Between what two values will the middle 90% of the money spent will fall?
f) Show a plot for 10,000 visitors using the above distribution.

Part6) Exponential distribution (15 points)

Suppose your cell phone provider's customer support receives calls at the
rate of 18 per hour.
a) What is the probability that the next call will arrive within 2 minutes?
b) What is the probability that the next call will arrive within 5 minutes?
c) What is the probability that the next call will arrive between 2 minutes
and 5 minutes (inclusive)?
d) Show the CDF of this distribution.

Submission:

Create a folder, CS544_HW4_lastName and place the following files
in this folder.

Write all the solutions in a single Word document,
HW4_lastName.doc.

For the code portions, provide all R code in a single file,
HW4_lastName.r

Archive the folder (CS544_HW4_lastName.zip). Upload the zip file to
the Assignments section of Blackboard.