Lab 4 Assignment

MA 2611

*Successful completion and submission of this assignment in html, pdf, or docx format through the use of R Markdown will meet one of your two required assignments for the **L.1 standard**. The following problems are numbered based on the lab standard that is intended be met. Your grade will be based on whether these standards are met. Refer to the syllabus for further details on standards-based grading.*

Problem L.11 and L.13. Let a discrete random variable $X \sim Poisson(10)$. Randomly generate and store a sample of $n = 2000$ values of X. Complete the following using your randomly generated sample:

a. Generate the code and output for calculating $P(X < 8)$ and $P(8 \leq X < 9)$. Compare the results to the *exact* probabilities for $X \sim Poisson(10)$ using the formulas learned in class. How close are the estimated to the exact probabilities?

b. Generate the code and output for calculating the expected value and standard deviation for X. Compare the results to the *exact* expected value and standard deviation for $X \sim Poisson(10)$ using the formulas learned in class. How close are the estimated to the exact values?

c. Using your randomly generated sample of X, create a bar graph which meets the following criteria:

- Uses fill and line colors which were not used in this or previous labs
- Contains appropriate axis labels and a title

Problem L.14. Let a discrete random variable $X \sim Binomial(12, 0.67)$. Generate the code and output for calculating the following probabilities:

a. $P(X > 14)$

b. $P(7 < X \leq 10)$

c. $P(X \leq 11)$

Problem L.15. Let a discrete random variable $X \sim Poisson(6.4)$. Generate the code and output for calculating the following probabilities:

a. $P(X \leq 4)$

b. $P(7 \leq X < 8)$

c. $P(X \geq 9)$

Problem L.8 and L.16. Let a continuous random variable $X \sim Normal(100, 81)$. Randomly generate and store a sample of $n = 2000$ values of X. Complete the following using your randomly generated sample:

a. Generate the code and output for calculating $P(X \geq 72)$ and $P(90 \leq X \leq 95)$. Compare the results to the *exact* probabilities for $X \sim Normal(100, 81)$ using the formulas learned in class. How close are the estimated to the exact probabilities?

b. Generate the code and output for calculating the expected value and standard deviation. Compare the results to the *exact* expected value and standard deviation for $X \sim Normal(100, 81)$ using the formulas learned in class. How close are the estimated to the exact values?

c. Create a histogram which meets the following criteria:

- Uses fill and line colors which were not used in this or previous labs
- Contains appropriate axis labels and a title

Problem L.17. Let a continuous random variable $X \sim Normal(18, 4)$. Generate the code and output for calculating the following probabilities:

a. $P(X \leq 12)$

b. $P(19 \leq X \leq 20)$

c. $P(X \geq 15)$