Lab 3 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.10. Using the imported *plovers* data frame:

a. Create a boxplot of the "Wingspan" data grouped by "Eggs" which meets the following criteria:

- Uses a fill color which was not used in this or previous labs
- Contains appropriate axis labels and a title

b. Create a histogram of the "Weight" data grouped by "Eggs" 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

c. Interpret the plots from **parts a and b**. Is there any indication that Wingspan or Weight are likely to differ based on the count of eggs in a given plover nest?

Problem L.11. Consider an **unfair** coin with a proportional likelihood, per flip, of $p_H = 0.2$ to get a heads and $p_T = 0.8$ to get a tails. Randomly generate and store a sample of $n = 1000$ independent coin flips. Using your sample, create a bar graph which meets the following criteria:

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

Problem L.11 and L.12. Let a discrete random variable $X \sim Binomial(8, 0.5)$. Randomly generate and store a sample of $n = 20000$ values of X and complete the following:

a. Calculate $P(X = 5)$ and $P(4 \leq X < 7)$ using the randomly sampled data and compare the results to the *exact* probabilities for $X \sim Binomial(8, 0.5)$ using the formulas learned in class. How close are the estimated to the exact probabilities?

b. Calculate the expected value and standard deviation for X using the randomly sampled data and compare the results to the *exact* expected value and standard deviation for $X \sim Binomial(8, 0.5)$ 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