MTHS3003 Portfolio 1

Use the **R** markdown template provided: MTHS3003_Assessment1_Template.Rmd to answer the questions below for your data set (based on your student number).

R code must be provided for all calculations. Calculations performed without **R** code will score 0 marks.

Deadline: 12 noon Friday 28 October.

Coursework

A car garage has asked you to undertake some statistical analysis for them. They have provided you with two data sets and a set of queries for each data set. In the data sets below Z should be replaced by the last number in your student number.

Data set 1: **Car_Sales_Z.csv** - The number of sales of Brand X cars per week for 2021.
Data set 2: **Car_Battery_Z.csv** - The lifetime in months of two types of car battery, type A and type B stocked by the car garage.

Data set 1

a. Summarise the data for sales of Brand X cars. You can use numerical summaries and/or plots. [4 marks]
   Do not produce every plot or numerical summary you can think of (0 marks will be given) but think about what gives a concise summary of the data.

b. Estimate the probability that 1 Brand X car will be sold in a given week. [2 marks]

c. Calculate the mean and variance for the number of Brand X cars sold in a period of 8 weeks. [2 marks]

d. Using the data from 2021, calculate the probability that there will be 23 weeks in 2023 where 0 Brand X cars will be sold. [2 marks]

Data set 2

a. Compare the lifetimes (in months) of battery types A and B. [4 marks]

b. Fit a distribution to the data for battery type B, including estimating the parameters. [4 marks]

c. The garage is looking to offer to replace for free any batteries which have a lifetime less than or equal to M months. What should M be, to 2 decimal places, if the probability of replacing a type B battery for free is 0.03? [2 marks]