UNIVERSITY OF THE FREE STATE
DEPARTMENT OF MATHEMATICAL STATISTICS AND
ACTUARIAL SCIENCE
STSM 2634

Assignment 2

Full marks: 50

Date: 17 March, 2025

Deadline: 22 March, 2025

FOLLOW THESE INSTRUCTIONS METICULOUSLY, OTHERWISE
MARKS WILL BE SUBTRACTED:

• **You must use R-Markdown to complete this assignment**. Assignments in any other format will NOT be accepted.

• Save the answer file as **'Assignment2_student number'** as the file name. Your **programming (code), and the output must be included in your answers**. Write the explanation after the code and the output as necessary.

• You have freedom to write the code in your own way. To get full marks, your code should be executable and producing the correct output. PARTIAL GRADING is possible depending on the quality of the code. You have freedom to write the code any way you like. **Smarter coding will get better marks. If the code fails to run, you will get 0.**

• This assignment should be submitted as a MS-Word file generated by R-Markdown.

• You are allowed to use the class notes, or any other help from the internet.

• All computations must be done with the help of suitable R functions. Manual or calculator-based answers will not be accepted.

• You will get 0 marks for submissions after the deadline.

Q1. Suppose a manufacturing plant produces 3 different products, and it has limited resources available for production. It has three different production units. Let X_1, X_2, X_3 be the number of machines to run for each product that are produced.

The weekly cost of running these machines (in R10000) in three different units can be framed as a system of linear equations:

$2X_1 - X_2 + 3X_3 = 4$

$3X_1 + 2X_2 - 5X_3 = 5$

$X_1 + 4X_2 + 2X_3 = 3$

Solve these equations with the help of R functions to find the number of machines to run for each product.

[15]

Q2. Draw random samples of size 1000, 100 000, 50 00 000, respectively, from uniform(0,1) distribution. Save them into three different variables, say, x1, x2, x3. **You do not need to print the random samples**. Then calculate the mean of x1, x2, x3. Which mean is the closest to 0.5. Explain your findings.

[15]

Q3. Get a dataset from a package in R. Analyse the data and prepare a report.

[20]

Note: Your assignment should be in R-Markdown Word format. Otherwise, your assignment will not be accepted.

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