

STAT2003 Analytics for Experimental and Simulated Data

Assignment 2

Use of Fractional Factorial Designs in Antiviral Drug Studies

GENERAL INFORMATION

MAXIMUM MARKS: 20

DUE DATE: 11pm, 26 May 2025

This is a group assignment; you must work in pairs. Only one response is required from each group.

How to submit: Submit your response to the task as a MS WORD Document via the Blackboard Turnitin Tab. Also upload the corresponding codes in a separate tab.

TASK

In this task you will explore fractional factorial designs method of experimentation for antiviral drug studies. Your task is to replicate the result of the Ding et al. (2013). This Paper is available on BB for your reference.

Questions [Marks- a: 5, b: 10, c: 5]

- a) Present essential components of the factorial experiment presented in Ding et al. (2018). In your answer include the following
- What is the purpose of this experiment? [1]
 - What are the experimental factors? [0.5]
 - How many levels are used with each factor, and why? [0.5]
 - What are the treatments in this experiment and specify these. [1]
 - What is the response? Does a higher or lower response indicate better outcome? [1]
 - Explain how basic principles of design of experiments are followed here. [1]

[Max of one page and 500 words]

Total = 5 marks [1, 0.5, 0.5, 1, 1, 1]

- b) Perform the analysis to reproduce the results in Table III. Clearly specify the design used and its properties. Present the analysis (as knitted R markdown file & R markdown file), interpretation of results and limitations.

[Max of one page and 1000 words]

Total = 10 [Design used 3, Analysis 4, interpretation 2, limitation 1]

- c) Recommend an alternative design that could have been used. Specify clearly the reasons for the choice of the design, process of generating design and any assumptions in the process.

[Max of one page and 1000 words]

Total 5 [Design choice; 3, generation : 2]

Reference:

Ding, Xianting, Hongquan Xu, Channele Hopper, Jian Yang, and Chih-Ming Ho. "Use of fractional factorial designs in antiviral drug studies." *Quality and Reliability Engineering International* 29, no. 2 (2013): 299-304.