Linear Models: Homework 3

2024-2025

The homework is individual work. On Blackboard you find the data file. This time you are asked to perform all data analyses with SAS. The report should be submitted as a pdf file, and the SAS code as a separate .sas file. Please submit your files via BB and give your files names of the following format:

LastName_FirstName_HW3.pdf
LastName_FirstName_HW3.sas

You really have to submit both files!

Note that this time you are not asked to use R markdown (you will not use R). So you are free to use whatever application for the writing of the report, but you need to submit the report as a pdf file, with you answers clearly organised under the titles "Question 1a", "Question 1b", ...

Introduction

Researchers are studying the effects of light intensity on algal growth to understand how environmental factors impact aquatic ecosystems. Algae samples are grown under three different light conditions, but the samples are taken from different water sources that may have varying nutrient profiles. The aim is to determine whether light intensity influences algal growth.

For each of three water sources (river, lake and pond), 15 water samples with algal biomass are randomised over the three light intensity regimes (low, medium and high), such that exactly 5 water samples are assigned to each of the regimes.

After a 14 day period of a given light intensity regime, the growth of the algal biomass is measured (in mg/L).

Question 1a

What statistical model(s) should be used for analysing the research question? Use the factor effects model formulation. Give a motivation.

Question 1b

Fit the model(s) suggested in Question 1a and use them for formulating an answer to the research question (SAS code should be provided in a separate .sas file and thus not included here).
Be complete (effect size(s), confidence interval(s) and hypothesis test(s)).

Question 1c

Assess all necessary model assumptions. You may include plots, but provide all SAS code in a separate file (not as part of the pdf report file).
Note: if the assumptions are not satisfied, you do NOT have to go back to the previous questions (i.e. the previous questions may be answered as if the model assumptions hold).