STAT505 Assessment #7

In this study, eight people were given drug A, and another eight people were given drug B. Each person's heart rate was measured at four time points (after 5, 10, 15, and 20 minutes) from when the drug was given. The data are available in the "drugs.dat". Columns correspond to person, heart rate measurements one through four, and drug type.

(a) Using the split-plot ANOVA model, test for interaction between time and drug. Report the degrees of freedom and p-value. Comment on the evidence for interaction.

(b) Using the same model as above, test for equal drug effects. Report the degrees of freedom and p-value. Provide an interpretation of these results in relation to your results in part (a).

(c) Fit the MANOVA model to this data, and create histograms of the residuals for each of the four heart rate measurements (you don't have to include them here). Comment on the assumption of normality.

(d) Conduct a test of equal covariance matrices for the two drug groups. Report the p-value. Comment on the assumption of equal covariance matrices.

(e) Provide a profile plot for the data with time along the horizontal axis. Comment on the evidence for interaction between time and drug type. Also comment on the evidence for a drug effect on heart rate.

(f) Using the MANOVA model, conduct a test for interaction between time and drug. Report the test statistic, degrees of freedom, and p-value. What is your conclusion at the .05 level of significance?

(g) Using the MANOVA model, conduct a test for equal drug effects by averaging over time. Report the test statistic, degrees of freedom, and p-value. What is your conclusion at the .05 level of significance? Provide an interpretation of these results in relation to your results in part (f).

(h) Comment briefly how the test in part (g) differs from the overall MANOVA test considered in the lessons last week.

(i) Note that the tests in parts (a) and (f) have the same null hypothesis, but the models provide different amounts of evidence to reject it. Briefly explain how the approach for part (a) is different from that for part (f).