Stat 705, Spring 2015: Homework 2

Hay fever relief: Consider the data of problem 19.14.

1. Obtain the interaction plot for these data; describe qualitatively what is happening with hours of relief based on this plot. Does there appear to be an interaction?

2. Fit ANOVA model V

$$Y_{ijk} = \mu + \alpha_i + \beta_j + (\alpha\beta)_{ij} + \epsilon_{ijk}, \quad \epsilon_{ijk} \overset{iid}{\sim} N(0, \sigma^2),$$

as described in class. Do you reject $H_0 : (\alpha\beta)_{ij} = 0$ at the 5% level? Does it make sense to examine main effects, e.g. $\alpha_2 - \alpha_1$?

3. Report the SAS standard diagnostic panel. Also prepare plots of the raw residuals vs. each factor. Comment on modeling assumptions including constant variance and normality.

4. Problem 19.32abcd. For part d you will construct a "lines" plot considering all 9 combinations of ingredient 1 and ingredient 2.

5. In an attempt to rid ourselves of the interaction, use `proc transreg` to perform a Box-Cox analysis on these data using something like `model boxcox(hours)=class(a|b);` What transformation does the "convenient lambda" correspond to?

Kidney failure hospitalization: Consider the data of problem 19.18.

1. Obtain the interaction plot for these data; describe qualitatively what is happening with days of hospitalization based on this plot. Does there appear to be an interaction?

2. Define a new variable to be the days of hospitalization plus one. Use `proc transreg` to perform a Box-Cox analysis on these data, using something like `model boxcox(days1)=class(duration|weight);` What transformation does the "convenient lambda" correspond to? Carry out this transformation and base the rest of the analyses below on it.

3. Fit the ANOVA model V

$$Y_{ijk} = \mu + \alpha_i + \beta_j + (\alpha\beta)_{ij} + \epsilon_{ijk}, \quad \epsilon_{ijk} \overset{iid}{\sim} N(0, \sigma^2),$$

as described in class. Do you reject $H_0 : (\alpha\beta)_{ij} = 0$ at the 5% level? Does it make sense to examine main effects, e.g. $\alpha_2 - \alpha_1$?

4. Test for main effects (using model V) $H_0 : \alpha_i = 0$ and $H_0 : \beta_j = 0$ using the Type III tests p-value at the 5% level. What do you conclude?

5. Report the SAS standard diagnostic panel. Also prepare plots of the raw residuals vs. each factor. Comment on modeling assumptions including constant variance and normality.

6. Obtain all pairwise comparisons for the two main effects *separately*, using Tukey's adjustment both times with the FER capped at 5%. Make "line plots" for duration and weight gain.