Statistics 512: Homework#10
Due April 18, 2014 BEFORE CLASS

1. KNNL 19.4

2. Recall the machine filling data set used in Homework#9. In that data set, there were three columns (Y, machine, and carton). Is carton (with levels 1-20) a second treatment factor that one could have included in the model? Explain. (HINT: How many cartons are really used in this experiment, 20 or 120? Would that column be a meaningful variable to include in your analysis?).

For the remaining questions use the hay fever data from problem 19.14 described on page 868 of the text.

3. Give a table of sample sizes, means, and standard deviations for the nine different treatment combinations.

4. Write the factor effects model for this analysis, and estimate the parameters of this model under the zero-sum constraint system (i.e. the one described on page 819 of the text). Also demonstrate that your estimates do in fact satisfy these constraints. Note: The estimates can be obtained in two ways:

   (a) using the output of the `means` statement and a calculator, as was done in the notes, or,

   (b) using repeated calls to `proc glm`.

   Whichever way you do it for the homework, I recommend that you also do it the other way (to check yourself).

5. Perform the two-way analysis of variance for this data set. State the null and alternative hypotheses for main and interaction effects in terms of the factor effects model parameters. For each test, give the test statistic with degrees of freedom and p-value, and your conclusion for each null hypothesis.

6. Make an interaction plot of the cell means with the level of ingredient 1 on the x-axis. Use a different line for each level of ingredient 2. Describe the plot in terms of main and interaction effects.

7. Check the assumptions of the ANOVA model using the residuals. Draw an overall conclusion regarding the validity of the conclusions you presented in question 5 above.