Statistics 512: Homework#11
Due April 25, 2014 BEFORE CLASS

Problems 1 - 3 refer to the soybean sausage dataset of Problem 20.8 (`ch21pr08.dat`).

1. Perform the two-way ANOVA without interaction for this model. Use the results of hypothesis tests to determine whether main effects are present (significant).

2. Plot the data vs. the temperature factor using three different lines for the three humidity levels. Based on your graph, do you think that interaction is important for this problem?

3. Use the Tukey comparison to determine all significant differences in means in the main effect for temperature.

For Problem 4, use the case hardening data described in Problem 24.6 on page 1022 of the text (`CH23PR06.DAT`).

4. Run the full three-way analysis of variance for these data, and check the assumptions. Summarize the results of the hypothesis tests for main and interaction effects, and your conclusions regarding the assumptions.

Problems 5 - 7 refer to the hay fever relief problem 19.14 on page 868 (`CH19PR14.DAT`). The two active ingredients occur in the following quantities in the study:

	Quantity (in milligrams)	
Factor	X_1	X_2
Level	(ingredient 1)	(ingredient 2)
Low	5.0	7.5
Medium	10.0	10.0
High	15.0	12.5

5. Treating the quantities of each ingredient as quantitative variables, analyze these data using linear regression. Include linear and centered quadratic terms for each predictor and the product of the centered linear terms:

$$Y_{i,j,k} = \beta_0 + \beta_1 x_{i,j,k,1} + \beta_2 x_{i,j,k,2} + \beta_3 x^2_{i,j,k,1} + \beta_4 x^2_{i,j,k,2} + \beta_5 x_{i,j,k,1} x_{i,j,k,2} + \epsilon_{i,j,k}.$$

   Summarize the results of this analysis.

6. Check the assumptions of the regression model used in Problem 5.

7. Give a discussion comparing the two-way ANOVA model and the regression (Problem 5) approaches to this analysis. Include a comparison of the values of R^2 for the two analyses and the conclusions drawn concerning interactions.