36-350: Data Mining

Homework 9
Date: November 2, 2001   Due: start of class November 9, 2001

1. The response table below was computed from an experiment where there were 5 measurements for each combination of the two predictors. What are the row effects? What are the column effects?

```
response
    Var2
Var1 B1 B2 B3
  A1 19 32 28
  A2 21 34 30
  A3 18 31 27
```

2. Four varieties of cotton were grown at seven centers, giving the yields in `cotton.dat`.

    (a) Transform the yields to a log scale. If the predictors were additive in the log scale, what would that tell us about the yields (in non-technical terms)?

    (b) Make a standardized profile plot with Center as the rows and another with Variety as the rows. Are the predictors close to additive? Explain.

3. A field is divided into six blocks, each block divided among three varieties of oats, and each variety split into four sub-plots receiving different levels of nitrogen treatment. The yield of each sub-plot is given in the data frame `oats.dat`.

    (a) Does the effect of using a different variety depend on the amount of nitrogen treatment? If so, how? Make a response table and explain your answer with a well-chosen profile plot.

    (b) Fit an additive model using `aov` to predict Yield from Nitrogen and Variety. List the effects.

    (c) Make an effects plot. Are the Variety effects different from zero with 95% confidence? What about the Nitrogen effects?

    (d) Does part (c) contradict your answer to part (a)? Hint: consider the assumptions of part (c).

4. In a study of the compressibility of natural rubber, the table in `rubber.dat` was generated. For different temperature and pressure combinations, the specific volume was measured.

    (a) For predicting volume, are temperature and pressure (roughly) additive? Explain your answer using a profile plot.

    (b) Fit an additive model using `aov.rtable` and make a standardized profile plot of the residuals. Describe the structure in this table.