**STAT5120, Assignment Week 10, Allen Baumgarten (Heat Fan)**

**Faraway, Question 1**

The *aatem*p data come from the U.S. Historical Climatology Network. They are the annual mean temperatures (in degrees F, the correct scale to use) in Ann Arbor, MI going back about 150 years.

a. Is there a linear trend?

b. Observations in successive years may be correlated. Fit a model that estimates this correlation. Does this change your opinion about the trend?

c. Fit a polynomial model with degree 10 and use backward elimination to reduce the degree of the model. Plot your fitted model on top of the data. Use this model to predict the temperature in 2020.

d. Suppose someone claims that the temperature was constant until 1930 and the began a linear trend. Fit a model corresponding to this claim. What does the fitted model say about this claim?

e. Make a cubic spline with six basis functions evenly spaced on the range. Plot the fit in comparison to the previous fits. Does this model fit better than the straight-line model?

**Faraway, Question 3**

Using the *ozone* data, fit a model with *O3* as the response and *temp*, *humidity* and *ibh* as predictors. Use the Box-Cox method to determine the best transformation on the response.

**Faraway, Question 6**

Use the *odor* data for this question.

a. Fit a second-order response surface for the *odor* response using the other three variables as predictors. How many parameters does this model use how many degrees of freedom are left?

b. Fit a model for the same response but now excluding any interaction terms but including linear and quadratic terms in all three predictors. Compare this model to the previous one. Is this simplification justified?

c. Use the previous model to determine the values of the predictors which result in the minimum predicted odor.