Assignment 6

1. Data on salaries, `Y83` and `Y84`, for chairs of the 50 largest corporations in Chicago are available. We have information about their age, number of shares they hold, total revenues and income. Using a model with percentage increase given from 1983 to 1984 (i.e., `100*(Y84-Y83)/Y83`) as the response, and the remaining 4 variables as predictors, check for outliers. Do you feel the variances of the raises are equal? If you feel they are not equal, what transformation could be used to improve matters? Make appropriate plots and give your conclusions.
2. The data were collected at an oil refinery on variables affecting the octane rating of gasoline. The variables are:

`A1:`	Amount of Material 1
`A2:`	Amount of Material 2
`A3:`	Amount of Material 3
`A4:`	A measure of manufacturing conditions
`rating:`	the octane rating

   Fit a model with the octane rating as the response and the other four variables as predictors. Perform a full set of regression diagnostics. Present the important plots, comment on their meaning and, where appropriate, indicate what action should be taken. Since it is easy to produce a very large number of plots, you will need to be selective. Take care to present examples of each major category of diagnostic. It is acceptable to just report the outcome of some plots without actually displaying them, especially if they do not show anything interesting.
3. The data for this question gives observations on the acceleration (`ACC`) of different vehicles along with their weight-to-horsepower ration (`WHP`), the speed at which they were traveling (`SP`), and the grade (`G`; `G=0` implies the road was horizontal).
   a. Run a regression using `ACC` as your dependent variable without making any transformations, and obtain the partial residual plots.
   b. Obtain a good fitting model by making whatever changes you think are necessary. Obtain appropriate plots to verify that you have succeeded.
   c. At least one of the partial residual plots in `part a` appears to show heteroscedascity (i.e., violation of var($\boldsymbol{\varepsilon}$)=$\sigma^2\boldsymbol{I}$), . If you have been successful in `part b`, the appearance of any serious heteroscedascity should vanish without your having to weight or transform the dependent variable. Explain why you think this happens.