This homework is due before class, March 24^{th} 2015.

- Do not use Zelig for this homework.
- Problem 1: Create a generic function to estimate a logistic model using maximum likelihood.
  - Use the examples in the lecture or textbook to create this function. For now assume that you have no missing data.
  - The inputs to this function should be a matrix of covariates and a vector of values for the dependent variable.
  - The outputs of this function should contain a matrix of coefficients similar in structure to what was required in the midterm, a variance covariance matrix, and a check of whether or not the model converged.
- Problem 2: Use this function to analyze the Muller and Seligson data on insurgency and inequality in the following way:
  - Download the file **Msrepl87.asc** from the dataverse at http://bit.ly/wccyDu as an ascii file.
  - Load this file into your workspace as follows:

```
ms<-read.table("/Users/mw160/Downloads/Msrepl87.asc", header=TRUE,
     colClasses=c("character",rep("numeric" ,22)))
rownames(ms) <- ms$country
```

  - Make the following transformations:
    - Create a variable, sanctions, that is the number of sanctions in 1970, per capita
    - Create a variable, deaths, that is 1 if the number of deaths in 1975 was 1 or more
  - Use the function you wrote for Problem 1 to estimate a model that predicts binary deaths as a function of an intercept and the variable sanctions.
  - Present the results in a coefficient plot. Write a paragraph summarizing the information you put in the table.
  - Next undertake a 10-fold cross-validation of this model, and assess whether or not the coefficient estimate on the sanctions variable changes depending on the fold. Additionally, for each fold you hold out provide a visual depiction of the performance (e.g, through a ROC or separation plot or both) for the model you estimated leaving out that fold.
  - Next determine the probability of there being a death in 1975 under six simple scenarios for the sanctions variable, specifically, the minimum, 1st quartile, median, mean, 3rd quartile, and maximum number of sanctions.
  - Last, extend this analysis by accounting for uncertainty in your model, using the strategies we developed in class and in the textbook. Provide a visual representation of this analysis.
  - Write this all up in a 3-5 page memo, with tables and chairs included.