Stat 359 Assignment 4

1. Beef consumption (in pounds per capita) in the United States between 1922 and 1941 are given in the data set beef.txt. Other variables of interest are beef price (in cents per pound divided by CPI), income (disposable income per capita in dollars divided by the CPI), and pork consumption (pounds per capita). [CPI= Consumer price index]. Find a model that "best" describes beef consumption in the United States. Complete a full analysis of the data (initial plots, model selection, residual plots etc.). Discuss your results.

2. A geriatrics researcher studied the effects of two interventions on the frequency of falls. Subjects were at least 65 years of age and in reasonably good health. The variables found in the dataset geriatric.txt are: number of falls, intervention (0=education, 1=education and aerobics), gender (0=female), balance index, strength index.

   (a) Fit a Poisson regression model based on $\mu = exp(\beta_0+\beta_1 x_1+\beta_2 x_2+\beta_3 x_3+\beta_4 x_4)$. Produce a table of estimated coefficients, their estimated standard errors, and the corresponding confidence intervals.

   (b) Obtain the model deviance and perform a goodness-of-fit test. State your conclusion.

   (c) Plot the deviance residuals (versus their index). Do there appear to be any outlying cases?

   (d) Use a deviance test to test the hypothesis that gender can be dropped from the model. What is your conclusion?

   (e) Fit a model without 'gender'. Obtain an approximate 95% confidence interval for β_1 (the coefficient for 'intervention') and interpret the confidence interval.

   (f) Is aerobic exercise associated with a reduction in the frequency of falls when controlling for balance and strength?