Directions: (Same as for previous homeworks.) Selected text pages are available in Canvas (from Files link, HW4_selections.pdf). Some starter SAS code is provided on the class website. This assignment will be graded out of 85 points (including 5 for neatness / format / SAS code in appendix).

Exercises: (Partial numeric solutions for some of these are provided in the solutions manual.)

1. (15 points) (This exercise is based on text problem 6.9bc)
   
   (a) Provide sequence plots for all three predictors and the response, and comment on any patterns observed.
   
   (b) Provide a scatterplot matrix and correlation matrix for all three predictors and the response, and comment on what these suggest.

2. (25 points) (This exercise is based on text problem 6.10)
   
   (a) Fit the multiple regression model, and report the estimated regression function. Provide an interpretation of each of the estimated regression coefficients.
   
   (b) Report graphical (histogram, normal prob. plot., sequence plot, residual plot) and numerical checks (Brown-Forsythe and correlation test of normality) of model assumptions, and comment briefly on what these suggest.

3. (10 points) Text problem 6.13. (Report both Bonferroni and Scheffe intervals, and indicate which is more efficient.)

4. (15 points) (This exercise is based on text problem 7.4)
   
   (a) Report \(SSR(X_1), SSR(X_3|X_1),\) and \(SSR(X_2|X_1, X_3)\) – note that order in the model statement of \texttt{proc reg} matters!
   
   (b) Conduct a subset F-test of \(H_0: \beta_2 = 0.\) Report the value of the F test statistic, the p-value, and your conclusion in context.
   
   (c) Fit two models with \(X_1\) and \(X_2\) as multiple predictors, the only difference being their order in the \texttt{model} statement of \texttt{proc reg}.
   
   Does \(SSR(X_1) + SSR(X_2|X_1) = SSR(X_2) + SSR(X_1|X_2)\)? Must this always be the case?

5. (15 points) (This exercise is based on text problem 10.16. Do not standardize the data.) Conduct a test for multicollinearity using both condition indices and variance inflation factors. Report the relevant numerical diagnostics from both approaches, and state your conclusion.