Class 8

Be sure to follow the *Assessment Guideline 1: Writing up Homework* at the end of the syllabus in preparing the homework for submission.

Homework assignments need to be uploaded to the blackboard website by 6 PM on the due date.

In each homework report, be sure to include an introductory and a summary paragraph. Also, it would be helpful for the graders for you to include the relevant parts of your SAS code where appropriate in your answer for each question.

A study was conducted to determine the degree of recovery that takes place 90 minutes following treatment in 36 children diagnosed at a clinic with moderate-to-severe dehydration. Patients were treated with an electrolyte solution in popsicle-form at different doses (measured in mEq/L). A rehydration scale score was subjectively assigned based on examination and parent report. The scores were scaled to potentially range from 0 to 100 (as a percent of recovery). In addition to dose, the age and weight of each child were recorded. The data on this study are stored in "*dehydration_s23.txt*" in the Assignments folder on Blackboard for Class 8. They have been stored in list format **with multiple observations per line** in this order: ID; rehydration score; dose; age; weight.

1. Run three multiple linear regressions predicting rehydration score.

   a) In model A, predict rehydration score from dose, age, and weight. Also, perform a collinearity diagnostic analysis for this model. Summarize all results.

   b) In model B, predict rehydration score from dose and age and perform collinearity diagnostics. What has changed by removing weight from the model?

   c) In model C, predict rehydration score from dose and weight and perform collinearity diagnostics. What has changed by removing age from the model?

   d) Which analysis do you prefer among models A), B), and C)? Why do you prefer the model that you chose?

2. Construct the following variables: 1) a grouping (categorical) variable with those who received of a dose of 0 through < 1 in group 1, those who received a dose of 1 through less than 2 in group 2, and those who received a dose greater than or equal to 2 in group; 2) three new continuous variables called *dose1*, *dose2*, and *dose3* with which you will be able to perform a piecewise linear analysis.

3. Perform analyses examining the relationship of rehydration score and dose below.

a)   Statistically compare the mean rehydration scores between the dose groups and summarize your results.

b)   Using simple linear regression, perform an analysis of the linear association o rehydration score and dose (continuous). Summarize these results.

c)   Perform a piecewise linear model using *dose1*, *dose2*, and *dose3* to predict rehydration score. Summarize the results. Does the piecewise model generate a higher R^2 than a simple linear model? Is the overall model statistically significant at the 0.05 level? What are the estimated individual slopes for *dose1*, *dose2*, and *dose3* and were they statistically significant predictors of rehydration score? Is the slope for *dose1* equal to the slope for *dose2* and is the slope for *dose2* equal to the slope for *dose3*?

d)   Which analysis among 2. a), b), and c) do you prefer for these data? Why? Present specific numeric evidence to support your choice.