

## Assignment #6

For each question, attach appropriate computer output for full points.

1. Refer to the **SENIC** data set in the previous assignments. We are interested in whether or not the mean length of stay ( $Y$ : **LOS**) is the same in the four geographic regions (**Region**).
  - a. Conduct a one-way ANOVA to compare the mean LOS among four regions. Write down the null and the alternative hypotheses. What is your conclusion based on the overall  $F$ -test?
  - b. If the overall  $F$ -test is significant, then proceed to multiple comparisons using Tukey's procedure. Report between which regions you find significant differences and corresponding Tukey's adjusted  $p$ -values. Also, report the estimated means and their 95% confidence intervals. Produce a mean plot with error bars indicating the lower and upper confidence limits.
  - c. Fit an appropriate regression model to perform the same one-way ANOVA analysis that you did in part a) above. Use the reference coding and the reference group should be the West region (Region = 4). Write down the estimated regression equation. Make sure to give your interpretations of beta estimates.
  - d. Repeat the part c) above, but this time using the effect coding. Write down the estimated regression equation. Make sure to give your interpretations of beta estimates.
  - e. For the one-way ANOVA that you did in part a), obtain a plot of residuals against the predicted values, a normal probability plot, and a histogram of residuals. Also conduct the Brown-Forsythe test for homoscedasticity. **What do you observe?** Are ANOVA assumptions met?
  - f. Use the Box-Cox procedure to find an appropriate power transformation of  $Y$ . What is the value of the "convenient" lambda? What transformation should be applied?
  - g. Use the "convenient" lambda to apply an appropriate power transformation on  $Y$ . Conduct a one-way ANOVA on the transformed  $Y$ . If necessary, conduct Tukey's multiple comparison procedure as well. Are the results same before and after the transformation? **Comment.**
  - h. Run ANOVA diagnostics, as you did in part e) above, on the transformed  $Y$ . Did the transformation help? What does the Brown-Forsythe test indicate? Are ANOVA assumptions met on the transformed  $Y$ ? **Comment.**
  - i. What is the appropriate back-transformation for the "convenient" lambda? Back-transform estimated means of the transformed  $Y$  into the original scale. Make sure to apply the same back-transformation to the lower and upper confidence limits. Report the means for the four regions and their 95% confidence intervals in the original scale.