STAT511 HW #6

Reading: Read Chapters 7 and 8 of Ott & Longnecker.
See Canvas Calendar for due date.
36 points total, 2 points per problem part unless otherwise noted.

1. In an investigation of the possible influence of dietary chromium on diabetic symptoms, 14 rats were fed a low-chromium diet and 10 were fed a control diet. One response variable was activity of the liver enzyme GITH. The data is available as "RatLiver.csv".
   A. Construct side-by-side boxplots of the data.
   B. Use the F-test to test for <u>equality of variances</u>. Give the null hypothesis, test statistic, p-value and conclusion. (**4 pts**)
   C. Use Levene's test (with center="median") to test for equality of variances. Give the p-value and conclusion.
   D. Based on your conclusions from parts B and C, would the pooled variance t-test or Welch-Satterthwaite t-test be preferred?
   E. Regardless of your answer to part D, run a two-sample t-test assuming <u>equal variances</u>. Give the null hypothesis, test statistic, p-value and conclusion. (**4 pts**)
   F. Rerun the analysis as a one-way ANOVA. Give the ANOVA table in your assignment. Compare your results to part E and notice that the p-value is the same and $F = t^2$.

2. A study explored how physical handicaps affect people's perception of employment qualifications. Subjects viewed mock interview tapes that differed only in that the applicate appeared with a different handicap (Amputee, Crutches, Hearning, Wheelchair or None). Subjects scored the applicants between 0 – 10. The data is from the textbook "Statistical Sleuth" and is available from the R package Sleuth3. To access the data, first install the Sleuth3 package and then;
   ```
   library(Sleuth3)
   data(case0601)
   str(case0601)
   ```
   A. Construct a bar plot showing means and SEs for each Handicap. (**4 pts**)
   B. Carry out a one-way ANOVA analysis to determine whether there is a significant difference (using α=0.05) in the mean Score for the different Handicaps. State the null hypothesis, give the test statistic, p-value and conclusion. (**4 pts**)
   C. Run pairwise comparisons of means. Give the p-value for each comparison.
   D. Calculate the LSD(0.05) value. Recall that this is the 95% ME for pairwise comparisons of means.
   E. Using the information from part C and/or D, construct a means display including the mean for each Handicap and underlining groups of Handicaps that are not significantly different. (**4 pts**)
   F. Use the plot() function to generate the diagnostic plots from the model from part B. You do not have to include the graphs in your assignment, but discuss the plot of residuals versus fitted values and whether the assumption of equal variances is reasonable.