ST511 HW#7

Reading: Read Chapters 8 and 9 of Ott & Longnecker
See Canvas Calendar for Due Date.

40 points total, 2 points per problem part unless otherwise noted.

1. An investigator was interested in health measures for dogs fed different diets. The response variable of interest was triglycerides. A total of 40 dogs were randomly assigned to one of 4 diets: Control, Navy bean, Black bean or Soy bean. Triglycerides were measured after 6 weeks of dietary intervention. The data is available from Canvas as DogDiets.csv.
   Note #1: Due to the question about Dunnett's comparisons in part K, you should reorder to levels of "Diet" so that Control is first. Use the following code after importing the data. Replace "MyData" with whatever you named the imported data.

```
levels(MyData$Diet)
MyData$Diet <- factor(MyData$Diet, levels(MyData$Diet)[c(2, 1, 3, 4)])
```

   A. Construct side-by-side boxplots of the Trig values for the different diet groups.
   B. Run the one-way ANOVA. Include your ANOVA table in your assignment.
   C. Consider the plot of residuals vs fitted values and qqplot of residuals. You do not have to include these plots in your assignment, but use them to discuss whether the assumptions of (1) equal variances and (2) normality hold. (**4 pts**)
   D. Run Levene's test (using default center="median"). Include the p-value in your assignment and discuss whether the assumption of equal variances holds for this data.
   E. You should have found that in part C that residual plot shows a megaphone shape. Find an appropriate transformation and apply it to the data so that equal variances are obtained. What type of transformation did you use? Include the plot of residuals vs fitted values after transformation in your assignment.

   Note #2: For the remaining questions (F-L), work on the transformed scale. There is no need to "back transform" for these questions.

   F. Run the one-way ANOVA after transformation. Include your ANOVA table in your assignment. State your conclusion.

   Note #3: For consistency, please use the multcomp package for questions G – L.

   G. Calculate unadjusted p-values for pairwise comparisons of means.
   H. Calculate Tukey adjusted p-values for pairwise comparisons of means.
   I. Calculate the Tukey HSD value. Note: Use the `qtukey()` function in R to find the exact table value.
   J. Create a "lines display" (ordered means with groups of non-significant differences underlined) with Tukey adjustment.
   K. Calculate Dunnett adjusted p-values for each of the bean treatments versus Control.
   L. Estimate and test the following contrasts. Use unadjusted p-values. **(8 pts)**
      1. Black bean vs Navy bean
      2. Mean of (Black and Navy beans) vs Control
      3. Mean of (Black and Navy beans) vs Soy bean.
      4. Mean of (Black and Navy beans) vs Mean of (Control and Soy bean)