**Lab Assignment: One-Way Analysis of Variance (ANOVA)**

For this assignment, use the online dataset “Response to Eye Color” found on the JASP Data Library webpage (https://johnnydoorn.github.io/DataLibraryBookdown/myChapters/chapter\_3.html). Details about this dataset are below. Complete all questions in all sections.

Dataset Description:

* This data set, "Response to Eye Color", provides post-advertisement attitudes towards a brand expressed by four different groups - each group saw the same advertisement except for the aspect that was manipulated: the eye-color of the model.

Variables:

* Group - Experimental conditions (`Blue' = Model with blue eyes, `Brown' = Model with brown eyes, `Green'= Model with green eyes, `Down' = Model's eye color cannot be seen).
* Subj - Participant number.
* Score - An average of 10 survey questions about attitudes towards the brand (7-point Likert scale). Higher averages correspond to more positive attitudes.

References:

* Moore, D. S., McCabe, G. P., and Craig, B. A. (2012). Introduction to the Practice of Statistics (7th ed.). New York: Freeman.
* Simpson, P. M., Sturges, D. L., and Tanguma, J. (2008). The eyes have it, or do they? The effects of model eye color and eye gaze on consumer as response. The Journal of Applied Business and Economics, 8: 60-72.

**Section 1. Examine the data (6 pts).**

1. What is the independent variable in this example?
2. What is the dependent variable in this example?
3. Which variable is the grouping variable?
   1. How many levels (J) does the grouping variable have?
   2. Which value in the dataset corresponds to which group?
      1. Write in that they are not coded as numbers.
4. Examine and briefly report relevant descriptive statistics, including measures of central tendency, variability, normality, and/or counts for each independent and dependent variable.

**Section 2. Hypotheses (4 pts).**

1. Write the null hypothesis using population statistic symbols.
2. Write the alternative hypothesis using population statistic symbols.
3. Using typical language, write the null hypothesis.
4. Using typical language, write the alternative hypothesis.

**Section 3. Assumptions (4 pts).**

1. Use a ggplot histogram to examine the data’s normality. Make sure to include relevant names for the x-axis, y-axis, a title or caption, and any color/line types you use.
2. Use the research design and original data source material to determine whether the assumption of independence is met.
3. Examine the homogeneity of variance assumption for all j groups.
4. Without yet running an ANOVA and directly examining variance components, make a prediction about whether groups differ from one another or not. Use your graphic(s) to justify your answer.

**Section 4. Fit a one-way ANOVA & Compare Models (4 pts)**

1. Fit both a restricted and full one-way ANOVA using aov(). Report your code.
2. Fit both a restricted and full one-way ANOVA using lm(). Report your code.
3. Using either the aov() or lm() model outputs, compare the fit between the restricted and full models. Report your code and output.
4. Based on your comparison, which model should you choose to interpret?

**Section 5. Interpretation (3 pts)**

1. Use a plot to examine the normality of errors within your model. Are errors normally distributed?
2. Calculate the coefficient of determination (eta-squared).
3. Calculate the F statistic and write a single sentence to report the findings. Include the appropriate df, F value, test for statistical significance, and effect size.

**Section 6. Write your Results (7 pts)**

1. Using APA formatting, write a concise 1 paragraph report describing the models you tested, model fit, model fit comparisons, model assumptions, model results, and any figures/tables relevant for interpreting model results.

**Section 7. Theory of ANOVA & Reflection (2 pts)**

1. Describe in no more than 3 sentences. ANOVA is used to examine group mean differences, yet we are speaking about ANOVA in terms of variance components and variability. What are at least two reasons we compare variance components instead of just examining mean differences?
2. When interpreting the omnibus F-test results, did you struggle? Why or why not?