**Assignment #4  
Due: April 18, 2023  
  
This is due prior to the beginning of live session on the due date. Use this document to answer questions. Include the questions with answers and highlight answers. Copy and paste relevant software output into this document in your answer. Software is only required to be used where indicated. Please submit as a word document or pdf.**

**Please identify any students you worked with on this assignment.**

1. [Week 10] A developmental psychologist placed children in a social situation in which they were either rewarded or punished (Factor A: consequence) by a parent, sibling, or stranger (Factor B: type of adult). Following this social situation, children were placed back in the same social situation, and the time it took them (in seconds) to engage in the punished or rewarded behavior was recorded. The data are given in the behavior tab of assignment4data.xlsx.
   1. Write the null hypotheses in words
   2. Write the alternative hypotheses in words
   3. Use software to obtain the test statistics and p-values. Report the two-way ANOVA table.
   4. Make a decision about each null hypotheses using the p-value approach.
   5. Write conclusion in APA style.
   6. Use software create an interaction plot. Give a brief interpretation in context of the variables.
2. [Week 11] A professor notices that more and more students are using their laptop computers in class to take notes. He wonders if this may improve academic success. To test this, the professor records the number of times each student uses his or her laptop during a class for one semester (Laptop) and the final grade in the class out of 100 points (Grade). The data are in the laptop tab of assignment4data.xlsx. The professor wants to conduct a hypothesis test to test whether or not there is a significant relationship between Laptop and Grade at the .05 level of significance.
   1. Using software, create a scatterplot and interpret. Does it seem to suggest there is a relationship?
   2. Write the null hypothesis and alternative hypothesis in symbols
   3. Using software, obtain the correlation coefficient and report the output for the hypothesis test
   4. Make a decision about the null hypotheses using the p-value approach
   5. Write conclusion in APA style
   6. If appropriate, calculate the effect size. If not, state why.
3. [Week 12] A psychologist believed that as children get older, they engage in more “inactive activities” such as playing computer games, watching TV and surfing the internet. She collected data from 10 children. She recorded the age of each child and the amount of activity (in hours) the child engaged in per week. The data are in the activity tab of assignment4data.xlsx.
   1. Using software, obtain a scatterplot of the data. Discuss the relationship between age and activity based on the scatterplot.
   2. Using software, obtain the simple linear regression linear regression line predicting activity from age.
   3. Interpret the intercept and slope of the regression line
   4. By hand, predict the amount of activity for age = 14
   5. By hand, calculate the residual for age = 14
   6. Using software output, test the null hypothesis that the slope coefficient is zero using the p-value approach. Write one sentence interpreting the meaning of this result. Make sure to report the test statistic and p-value.
   7. Using software, obtain and report the 95% CI for the slope coefficient. Explain how we can use it to make a decision about the null hypothesis from part (f).
   8. Using software, test the null hypothesis that the population coefficient of determination is zero using the p-value approach, and write one sentence interpreting your result. Make sure to report the test statistic and p-value.
   9. How do the test statistics in (f) and (h) mathematically relate to each other?
4. [Week 13] The following data represent measures a random sample of 25 individuals with high cholesterol levels. The variables are as follows:

Dependent variable Y: Systolic Blood Pressure (SBP)

Independent variable X\_1: Body Size, measured by Quetelet (QUET) Index 100(weight/height2)

Independent variable X\_2: Age

The data are in the bloodpressure tab of assignment4data.xlsx.

* 1. Using software, carry out MLR analyses to obtain raw regression coefficients. Mean center age and QUET.
     1. Write the regression equation
     2. Interpret the intercept
     3. Interpret the slope for QUET
     4. Interpret the slope for age
     5. Interpret the hypothesis tests for each regression coefficient
  2. Report the coefficient of multiple determination obtained in your MLR analysis and interpret the associated hypothesis test.
  3. For an individual of age 51 and QUET 3.30, obtain by hand calculation the predicted level of SBP (remember they should be mean centered). If that individual’s actual SBP was found to be 130, obtain the residual.