Homework assignment 07

Use black text (if possible) for everything you include in this document. Keep both your answers and the original questions. Save this document in PDF format and submit it on Canvas. Include your last name, the course number and the module number in the name of your file.

For every assignment, make sure that your graphs conform to the following requirements:

* Do not display unnecessary decimal places on your graph axes.
* Include units of measurement (when appropriate) on graph axis labels
* Avoid the unnecessary use of color unless color is needed to distinguish between groups. Fill boxes and points with white or transparent colors.
* Include ticks on both axes
* Replace the default title provided by SPSS with one that includes your name and the date
  + For example, “This scatterplot was produced by Steve Simon on 2023-09-19”

You do not need to show any dialog boxes or program code. You are welcome to use a program other than SPSS (e.g., Python, R, SAS, Stata) if you are adventurous.

1. Show a documentation header. The documentation header is a description of who wrote the program, when it was written, what the purpose of the program is (briefly), and what restrictions (if any) that you may place on the program. For SPSS, you can just type the documentation as free format text. For other programs, you might use the comment feature (such as /\* and \*/ in SAS).

2. Download the file data-07-sway.txt. Import the data into SPSS. Show the first ten rows of data here.

3. Draw plots comparing the front-to-back sway value between the two age groups. Repeat for the side-to-side sway value. Show the graphs below.

4. Do the boxplots show any problems with non-normality and/or heteroscedascity?

5. Calculate an independent samples (two sample) t-test in SPSS for testing the one-tailed hypotheses that elderly patients have a greater average sway. Do two separate tests, one for front-to-back sway and one for side-to-side sway. Show the dialog box or program code along with all of the output.

6. Summarize the results of the t-tests in a language suitable for a journal article.

7. Download the file data-07-reiki.txt. Import the data into SPSS. Show the first ten rows of data here.

8. Calculate the difference between VAS.before and VAS.after and the difference between Likert-before and Likert-after. Show the first ten rows of data after computing these variables.

9. Draw histograms and Q-Q plots for both of these differences. Show the results below.

10. Do these plots suggest a problem with non-normality.

11. Calculate a paired differences t-test for VAS and Likert measures of pain.

12. Summarize the results of these tests in a language suitable for a journal article.

13. Explain why some researchers might object to the use of t-tests for the VAS or Likert measures of pain?

5.

The following is the assignment from last year. I am keeping it around until I finalize this year’s assignment.

Prelude: Open both SPSS HW data sets and assess each for structure. There are two data sets and two analysis problems and one final Question in this assignment. You will use one of the data sets for one of the problems and the other data set for the other problem. You must match the correctly structured data set to the analysis method. This assignment is worth 20 points.

\*\*\* Rename the variables in both data sets by placing your last name in front of the existing variable

Names or in the Data Label in Variable view.. For example: **New Test Score** becomes **Gaddis New Test Score.**

**\*\*\*** Use a different colored font for your answers.

- Read the Problem/Scenario below.

- Determine the analysis method that you will use to answer the research question that you will write.

- Select the appropriate data set based on its structure to use for the required analysis

- Read all Questions

- Run the analysis

- Answer all questions

- Follow all directions

**Problem/Analysis 1:**

A high school in the Kansas City School District wanted to assess a new method of testing competency in calculus for its International Baccalaureate students. The district administrators believed that the new test method was superior to the old method and that more students would achieve better grades in calculus with the new method. To assess the new test method, a class of students taking calculus was tested using the old testing method and the new testing method. The teachers assigned to this process wanted to see if the new method of testing was indeed better than the old method of testing. Following the teaching of a new unit of information to the students, a test to assess competency with the new material was given. The students were randomly assigned to be assessed by either the old test or the new test. Half of the class took the old test and half took the new test. One day later, the student were again assessed. This time, those students who took the new test first, now took the old test. Those students who first took the old test, now took the new test. All students took both tests. The class consisted of 20 students. Test scores were recorded on a continuous data scale of 0-100 points.

Select a statistical test and its correctly structured data set with which you will analyze this data. Assess for all assumptions. If assumptions are not met, you will still complete the analysis as directed using the data in the data set as is.

**DO NOT CHANGE REMOVE OR TRANSFORM ANY DATA IN THIS DATA SET!**

1. State the Null Hypothesis in words.

2. State the Null Hypothesis mathematically.

3. What main statistical analysis method did you choose to test your hypothesis?

4. Explain why you selected this test to analyze this data.

5. Assess for all Assumptions:

Complete the following table – completely. Include **ALL** assumptions that must be met for the running of this analysis method. (Add rows as needed.)

|  |  |  |  |
| --- | --- | --- | --- |
| Assumption | Method used to test Assumption | Result of method | Decision (Met or did not meet Assumption) |
|  |  |  |  |

6. The SPSS analysis output did not contain the table for the test results of homogeneity of the variances. Why? Explain.

7. What is the calculated Main Test statistic from your analysis? (Value)

8. What is the precise level of significance obtained by the calculated main test statistic? (Precise Value)

9. Have you accepted or rejected the null hypothesis?

10. Hand calculate the effect size for this analysis. (Show your work – DO NOT USE SPSS)

11. What judgement can you make about this effect size?

12. Write the results of this study as if submitting to a journal that requires significant statistical analysis detail. Be sure to include a description of the research problem, information about the subjects, the hypotheses (null and research), the research question, the names of the tests for all of the assumptions and their results. Include the precise name of the main analysis test chosen. Report the appropriate measure(s) of central tendency and measure(s) of variability, the degrees of freedom, the main test statistic, p value (precise), and effect size in your write up. Include any other important findings. Include a decision about the null hypothesis. Include a statement about the outcome of the research question and its relevance (How can this finding be applied?).

\*\*Please note: This write up will be graded for content and completeness and is worth **3 points**.

**\*\*\***All pertinent tables and graphs for Problem/Analysis 1 should be included in this homework assignment. Paste tables and graphs here.

**Problem/Analysis 2:**

Administration from a high school in the Kansas City School District wanted to assess a new method of testing competency in calculus for its International Baccalaureate students. The district administrators believed that the new method of testing was superior to the old method and that more students would achieve better grades in calculus with the new method. To assess the new testing method, one of the two classes of calculus was tested using the old test method and the other class was tested using the new test method. The teachers assigned to this process wanted to see if the new method of testing was indeed better than the old method of testing. Following teaching the same unit of information to their students, each class was given a test to assess competency with the new material. Class A was given the new test and Class B was given the old test. Each class consisted of 20 students. These students had been randomly assigned to their calculus class at the beginning of the school year. Test scores were recorded on a continuous data scale of 0-100 points.

Select a statistical analysis method and its correctly structured data set with which you will analyze this data. Assess for all assumptions. If assumptions are not met you will still complete the analysis as directed using the data in the data set as is.

**DO NOT CHANGE REMOVE OR TRANSFORM ANY DATA IN THIS DATA SET!**

1. State the Null Hypothesis in Words.

2. State the Null Hypothesis mathematically.

3. What main statistical analysis method did you choose to test your hypothesis? Be precise.

4. Explain why you selected this test to analyze this data.

5. Assess for all Assumptions:

Complete the following table – completely. Include **ALL** assumptions that must be met for the running of this analysis method. (Add rows as needed.)

|  |  |  |  |
| --- | --- | --- | --- |
| Assumption | Method used to test Assumption | Result of method | Decision (Met or did not meet Assumption) |
|  |  |  |  |

6. What does the information from the Levene’s test, found in the output of this analysis, tell you?

\*Your answer should include what the Levene’s test assesses and the actual results and interpretation

from the analysis for this problem.

7. What is the calculated main test statistic obtained from the analysis method selected to analyze this data? (Value)

8. What is the precise level of significance obtained by the calculated main test statistic? (Precise Value)

9. Have you accepted or rejected the null hypothesis?

10. Hand calculate the effect size for this analysis. (Show your work – DO NOT USE SPSS)

11. What judgement can you make about this effect size?

12. Write the results of this study as if submitting to a journal that requires significant statistical analysis detail. Be sure to include a description of the research problem, information about the subjects, the hypotheses (null and research), the research question, the names of the tests for all of the assumptions and their results. Include the precise name of the main analysis test chosen. Report the appropriate measure(s) of central tendency and measure(s) of variability, the degrees of freedom, the main test statistic, p value (precise), and effect size in your write up. Include any other important findings. Include a decision about the null hypothesis. Include a statement about the outcome of the research question and its relevance (How can this finding be applied?).

\*\*Please note: This write up will be graded for content and completeness and is worth **3 points.**

**\*\*\***All pertinent tables and graphs for Problem/Analysis 2 should be included in this homework assignment. Past tables and graphs here.

**Final Question:** **(3 Points)** Compare and contrast the two tests in terms of Type I error rate, degrees of freedom, power, and effect size. Explain the differences/similarities seen in these components (Compare and contrast the tests in terms of these characteristics.).

**\*\*\*\***Do not turn in more than one document/attachment. Everything should be included in one single very organized Word document.