**MM570 Applied Statistics for Psychology**

**Unit 6 Project: Descriptive Statistics**

**Review Sheet**

**Place all answers, work, and graphs in this document.**

**Use alpha = .05 for all hypothesis testing questions.**

**\*\* Please use non-directional two-tailed tests for these questions (not one-tailed tests).**

**\*\*All SPSS output must be shown for problems 1 - 3. If all SPSS is not shown no credit (0 points) will be given for the entire problem.**

1. Recall that the dataset, Stat\_grades.sav, contains data for a sample of 105 statistics students. One of the variables in this dataset is called, **review**. This variable is either “1” for “NO” (did not attend the review sessions), or “2” for “YES” (did attend the review sessions). In other words, the Instructor for all the students decided to provide additional optional review opportunities for students to learn the class materials. To accomplish this, the Instructor offered all students the option to attend a set of **review** sessions. *The Instructor believes that offering these review sessions will help student performance.* Using the appropriate statistical test, methods, and evaluations, determine if attending the **Review** sessions made a *significant difference* in students **Final Exam Points**. Be sure to include each step of the process, any SPSS results used, an interpretation of the results, and the final conclusions.

(a) What is the hypothesis being tested here?

What is the research question that is being asked? Write down the research question and explain what is being investigated.

(b) What are Ho and Ha?

Step 1:

Before you write Ho and Ha, determine what type of test needs to be used. Your choices are t-test for independent samples, t-test for a single sample, or paired sample t-test. Review the explanations below to determine what type of test to use.

**t-test for independent samples**

We use this option when we compare two sample means from two groups. We have two groups that we are comparing together. Both groups are from our sample.

**t-test for a single sample**

We are comparing one sample with the known and given population parameter.

**Paired Sample t-test**

Example: In a paired data t-test each participant takes a pre-tests, then participates in an intervention, and then later take a posttest. This data is dependent. Each participants pretest score is paired with their posttest score.

Step 2:

Match your t-test up with the appropriate formatting. Review the formats below and use them as a guide for writing your hypotheses. Remember that your hypotheses should be for a two-tailed test.

**t-test for independent sample means**

*Ho: The mean bear height for female bears = the mean bear height for male bears.*

*Ha: The mean bear height for female bears ≠ The mean bear height for male bears*

**t-test for a single sample mean**

Based on previous information, a biologist has determined that the mean bear head width is 8 in. Do the set of bears in our sample differ significantly?

Here we are trying to determine if our sample of bears is significantly different from a given population mean of 8.

*Ho: The mean bear head width of our sample = 8*

*Ha: The mean bear head width of our sample ≠ 8*

**Example 3 (Paired-sample t-test)**

Ho: mean pretest score for ethics training = mean posttest score for ethics training

Ha: mean pretest score for ethics training ≠ mean posttest score for ethics training

This is paired data because each participant takes the pre-tests, then participates in ethics training, and then later take the posttest. This data is dependent. Each participants pretest score is paired with their posttest score.

(c) What is the name of the test you will run? Run the appropriate SPSS test and include the SPSS output here.

Part a: What is the name of the test you will run? You answered this in step 1 of part b. Write the name of the test here.

Part b: Run the appropriate SPSS test and include the SPSS output here. Paste all your output from SPSS in this space.

*\*\*All SPSS output must be shown for this problem. If all SPSS is not shown no credit (0 points) will be given for the entire problem.*

(d) What are the results of the test? What is the p-value and is it larger or smaller than the alpha value – show your work and explain the result.

To respond to this question complete the following parts:

Part a: Write down the p-value here.

Part b: Compare the p-value to alpha. Remember that everyone is using α = 0.05.

Part c: Do you “reject the null hypothesis” or “fail to reject the hypothesis?” Justify the choice you make with your results of the comparison in part b.

(e) Write a conclusion for the above in plain English so that any person could understand. What can you say about the review and its effect on total points and student overall performance?

Write a conclusion for the above in plain English so that any person could understand. What can you say about the review session and its effect on student performance? Be sure to include whether there was a “significant difference” or “not a significant difference” in your results. Did the review session make a significant difference on student performance as measured with final exam points?

**\*\*All SPSS output must be shown for problems 1 - 3. If all SPSS is not shown no credit (0 points) will be given for the entire problem.**

2. Based on many years of past classes and experience, the Instructor for the students in the Stat\_Grades.sav dataset has determined that the mean value for **previous GPA** is 2.75. Does the **previous GPA** for the students in Stat\_Grades.sav differ significantly from the known population GPA at 2.75? Use and include the appropriate statistical test, methods, and evaluations. Be sure to include each step of the process, any SPSS results used, an interpretation of the results, and final conclusions.

(a) What is the hypothesis being tested here?

What is the research question that is being asked? Write down the research question and explain what is being investigated.

(b) What are Ho and Ha?

Step 1:

Before you write Ho and Ha, determine what type of test needs to be used. Your choices are t-test for independent samples, t-test for a single sample, or paired sample t-test. Review the explanations below to determine what type of test to use.

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Step 2:

Match your t-test up with the appropriate formatting. Review the formats below and use them as a guide for writing your hypotheses. Remember that your hypotheses should be for a two-tailed test.

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*Ho: The mean bear height for female bears = the mean bear height for male bears.*

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**t-test for a single sample mean**

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Here we are trying to determine if our sample of bears is significantly different from a given population mean of 8.

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This is paired data because each participant takes the pre-tests, then participates in ethics training, and then later take the posttest. This data is dependent. Each participants pretest score is paired with their posttest score.

(c) What is the name of the test you will run? Run the appropriate SPSS test and include the SPSS output here.

Part a: What is the name of the test you will run? You answered this in step 1 of part b. Write the name of the test here.

Part b: Run the appropriate SPSS test and include the SPSS output here. Paste all your output from SPSS in this space.

*\*\*All SPSS output must be shown for this problem. If all SPSS is not shown no credit (0 points) will be given for the entire problem.*

(d) What are the results of the test? What is the p-value? Compare the p value to alpha and note the result.

Part a: Write down the p-value here.

Part b: Compare the p-value to alpha. Remember that everyone is using α = 0.05.

Part c: Do you “reject the null hypothesis” or “fail to reject the hypothesis?” Justify the choice you make with your results of the comparison in part b.

(e) Explain the conclusion in plain English so that any person could understand. Did the students in Stat\_Grades.sav do significantly differently than the population mean of 2.75? How did they do and what did you find. Explain.

Write a conclusion for the above in plain English so that any person could understand. What can you say about the previous GPA being 2.75? Be sure to include whether there was a “significant difference” or “not a significant difference” in your results. Did the previous GPA in the Stat\_Grades.sav file significantly differ from the value from past years?

**\*\*All SPSS output must be shown for problems 1 - 3. If all SPSS is not shown no credit (0 points) will be given for the entire problem.**

3. Using the Stat\_Grades.sav dataset, compare **Quiz 1** and **Quiz 3** and determine if there is a statistically significant difference in the average student performance between these two quizzes. Use and include the appropriate statistical test, methods, and evaluations. Be sure to include each step of the process, any SPSS results used, an interpretation of the results, and final conclusions.

 (a) What is the hypothesis being tested here?

What is the research question that is being asked? Write down the research question and explain what is being investigated.

(b) What are Ho and Ha?

Step 1:

Before you write Ho and Ha, determine what type of test needs to be used. Your choices are t-test for independent samples, t-test for a single sample, or paired sample t-test. Review the explanations below to determine what type of test to use.

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**Paired Sample t-test**

Example: In a paired data t-test each participant takes a pre-tests, then participates in an intervention, and then later take a posttest. This data is dependent. Each participants pretest score is paired with their posttest score.

Step 2:

Match your t-test up with the appropriate formatting. Review the formats below and use them as a guide for writing your hypotheses. Remember that your hypotheses should be for a two-tailed test.

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(c) What is the name of the test you will run? Run the appropriate SPSS test and include the SPSS output here.

Part a: What is the name of the test you will run? You answered this in step 1 of part b. Write the name of the test here.

Part b: Run the appropriate SPSS test and include the SPSS output here. Paste all your output from SPSS in this space.

*\*\*All SPSS output must be shown for this problem. If all SPSS is not shown no credit (0 points) will be given for the entire problem.*

(d) What are the results of the test? What is the p-value? Compare the p value to alpha and note the result.

To respond to this question complete the following parts:

Part a: Write down the p-value here.

Part b: Compare the p-value to alpha. Remember that everyone is using α = 0.05.

Part c: Do you “reject the null hypothesis” or “fail to reject the hypothesis?” Justify the choice you make with your results of the comparison in part b.

(e) Explain the result and conclusion of the test in plain English so that any person could understand.

Write a conclusion for the above in plain English so that any person could understand. What can you say about whether there is a statistically significant difference between the average student performance on quiz 1 and quiz 3. Be sure to include whether there was a “significant difference” or “not a significant difference” in your results. . Was there a significant difference between student scores on Quiz 1 and Quiz 3?



(a) What is Ho and Ha?

Step 1:

Before you write Ho and Ha, determine what type of test needs to be used. Your choices are t-test for independent samples, t-test for a single sample, or paired sample t-test. Review the explanations below to determine what type of test to use. <Hint: look at the title of the second box of SPSS output.>

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**t-test for a single sample**

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Example: In a paired data t-test each participant takes a pre-tests, then participates in an intervention, and then later take a posttest. This data is dependent. Each participants pretest score is paired with their posttest score.

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Match your t-test up with the appropriate formatting. Review the formats below and use them as a guide for writing your hypotheses. Remember that your hypotheses should be for a two-tailed test.

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This is paired data because each participant takes the pre-tests, then participates in ethics training, and then later take the posttest. This data is dependent. Each participants pretest score is paired with their posttest score.

(b) What t-test is being used?

You answered this in step 1 of part a. <Hint: look at the title of the second box of SPSS output.>

(c) What is the p value? (Assume equal variances)

Look in the SPSS output to find the p-value (equal variances assumed). Write it here.

(d) Using alpha at .05, what is the result of this test?

Part a: Compare the p-value to alpha. Remember that everyone is using α = 0.05.

Part c: Do you “reject the null hypothesis” or “fail to reject the hypothesis?” Justify the choice you make with your results of the comparison in part b.

(e) Write the full conclusion for this test in plain English so anyone can understand.

Write a conclusion for the above in plain English so that any person could understand. What can you say about whether there a significant difference in Quiz 5 points for the students in Stat\_Grades.sav (called Previous GPA) and the known past population mean for Quiz 5 points? Be sure to include whether there was a “significant difference” or “not a significant difference” in your results. Did the mean of the Quiz 5 points in the Stat\_Grades.sav file significantly differ from the value from past years?

(f) How many students are in this sample of data? Is the mean GPA for the sample of students different than for the known population? Is it *significantly different*? What does it mean to be *significantly different* (versus just different)?

Part a: How many students are in this sample of data? => Use the first box of SPSS output to help with this.

Part b: Is the mean points our sample of students different than the known population => Use the first box of SPSS output to help with this.

Part c: Is it *significantly different*? => Use parts d and e to help formulate your response.

Part d: What does it mean to be *significantly different* (versus just different)?