**Homework 2**

**10 points**

**Due on Canvas: Monday 3/16 @ 8:40am**

Reminder: Late assignments will be accepted, but you will lose 1 point for each calendar day late. I suggest starting this early and not waiting until the last minute- if there are last minute technical issues/ glitches, I probably can’t help you!

1. Assume you are running a one-tailed test to see if a medication reduces depression symptoms. *Hint: for these questions, look at Slides 21-23 in the Class 10 PowerPoint.*

a. On the normal curve below, draw a line that would mark the critical value(s) at *p*<.05 for this research hypothesis and label the Z-score cutoff value (1/3 point).

b. Shade in the portion(s) of the curve that contains values extreme enough that you would reject the null hypothesis (1/3 point).

c. Indicate what % of the distribution is in the shaded portion(s). (1/3 point)

A screenshot of a cell phone

Description automatically generated



2. Now you are running a two-tailed test to see if a medication impacts depression symptoms.

a. On the normal curve below, draw a line(s) that would mark the critical value(s) at *p*<.01 for this research hypothesis and label the Z-score cutoff value(s) (1/3 point).

b. Shade in the portion(s) of the curve that contains values extreme enough that you would reject the null hypothesis (1/3 point).

c. Indicate what % of the distribution is in the shaded portion(s). (1/3 point)

A screenshot of a cell phone

Description automatically generated



**Scenario 1**

Pretend you are a researcher in a child anxiety lab. Your team is developing an app to help children cope with anxiety. You decide to run a study to see if app use in elementary school can reduce anxiety symptoms in middle school. You know that in the general population, middle school students have an average anxiety score of 18 with a standard deviation of 4.5. You decide to run a **two-tailed test using *p*<.05 as the cutoff**.

1. What is the general population’s μ? (1/4 point) **18**

2. What is the general population’s σ? (1/4 point) **4.5**

3. What are the two populations of interest? (1/4 point)

**Population 1: middle schoolers that used the app in elementary school**

**Population 2: middle schoolers in the general population**

4. State the research hypothesis and null hypothesis. Write them as a sentence first (1/4 point) and then as an equation using μ1 and μ2 (1/4 point).

**Research hypothesis: Population 1’s mean will differ from population 2’s mean.**

**μ1** ≠ **μ2**

**Null hypothesis: Population 1’s scores are equal to population 2’s scores.**

**μ1= μ2**

5. What are the *Z*-score cutoff scores for a two-tailed test at the .05 level? **-1.96 and 1.96** (1/4 point)

6. You run your study and find that the children who used the app in elementary school had an average anxiety score of 12.5 in middle school.

a. Transform the raw score of 12.5 into a *Z*-score: **-1.22** (1/4 point) 12.5-18/4.5

b. Would you reject or fail to reject the null hypothesis? Show your work. (1 point)

**This is not extreme enough to reject the null hypothesis because the cut off is at -1.96.**

12.5-18/4.5= -1.22222

c. Write a sentence summarizing the finding (i.e. did it work?) (1/2 point)

**The difference in the scores of students who used the app in elementary school and those who didn’t was not statistically significant.**

7. You decide to make some changes to the app and run the study again. This time, the children who used the app have an average anxiety score of 9.9 in middle school. Would you reject or fail to reject the null hypothesis? Show your work.

a. Transform the raw score of 9.9 into a *Z*-score:\_**-1.8** (1/4 point)

b. Would you reject or fail to reject the null hypothesis? Show your work. (1 point)

**I would fail to reject the null hypothesis because it is not beyond the cutoff of -1.96.**

**9.9-18/4.5= -1.8**

c. Write a sentence summarizing the finding (i.e. did it work?) (1/2 point)

**The difference in the scores of students who used the app in elementary school and those who didn’t was not statistically significant.**

**Scenario 2**

Use the same study as Scenario 1, however, now you are going to use **one-tailed tests using *p*<.01** as the cutoff. Your directional hypothesis is that the app will decrease anxiety.

1. State the one-tailed research hypothesis and null hypothesis. Write them as a sentence first and then as an equation using μ1 and μ2 (1/4 point).

**Research hypothesis: population 1’s mean will be higher than population 2’s mean.**

**μ1 > μ2**

**Null hypothesis: population 1’s scores are equal to population 2’s scores.**

**μ1 = μ2**

2. What is the *Z* score cutoff for this study (one-tailed test using *p*<.01)?  **-2.33**  (1/4 point)

3. You run your study and find that the children who used the app in elementary school had an average anxiety score of 7.3.

a. What is the *Z* score for this sample score? **-2.37**(1/2 point)

b. Would you reject or fail to reject the null hypothesis at the .01 level? Show your work. (1 point)

**you could reject the null hypothesis because the cut off is -2.33 and this is beyond that.**

7.3-18/4.5=-2.37

4. What if the children who used the app in elementary school had an average anxiety score of 9.1? Would you reject or fail to reject the null hypothesis at the .01 level? Show your work. (1 point)

**You would fail to reject the null hypothesis because this does not go beyond the cut off.**

**9.1-18/4.5= -1.977**