# PSYCH308A - Data Analysis 4 (DA4)

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## Contents

Question 01 Answer to						 													•	 •	<b>2</b>
Question 02 Answer to					 	 															2
Question 03 Answer to						 															<b>2</b>
Question 04 Answer to	ا ( <b>ر</b> ، Q(	<b>204</b> ) 04: .	) <b>:</b>			 	 						•		•		•		•		<b>3</b>
Question 05 Answer to					 	 															<b>3</b>
Question 06 Answer to					 	 															<b>3</b>
Question 07 Answer to	' <b>(C</b>	<b>207</b> ) 7: .	) <b>:</b>			 	 										•				<b>3</b>
Question 08 Answer to						 	 										•				<b>4</b>
Question 09 Answer to					 	 															<b>4</b>
Question 10 Answer to	) ( <b>C</b>	<b>210</b> )	) <b>:</b>		 	 															<b>4</b>
Question 11 Answer to	. ( <b>C</b>	<b>211</b> ) 1: .	):		 	 															<b>5</b>
Question 12 Answer to					 	 	 														<b>5</b>

### Question 01 (Q01):

1. Interpret a p-value of .042. (This question is **not** asking for the decision this p-value results in, rather what does this value mean?)

#### Answer to Q01:

A p-value of .042 implies that the finding of some statistical test (z-test, t-test, etc.) that the probability of obtaining the test statistic found or something more extreme was .042 (a.k.a. 4.2%) assuming the null hypothesis was true

## Question 02 (Q02):

2. *In no more than two sentences*, what is the relationship between sample size, effect size, and power?

#### Answer to Q02:

Power is positively correlated with both sample size and effect size in a manner that convolutes the two (sample and effect). That is to say, the power of a finding will increase if either sample size increases or effect size increases, and if one (e.g. sample size) is necessarily small, a higher power can be achieved by increasing the other (e.g. effect size).

### Question 03 (Q03):

3. A researcher records the number of words recalled by students presented with a list of words for 1 minute. In one group, students were presented with the list of words in color; in a second group, the same words were presented in black and white. An equal number of students were in each group. The researcher reports the following: Participants recalled significantly more words when the words were presented in color (M = 12.4 words) versus black and white (M = 10.9 words), t(48) = 2.01, p = .035, d = 0.18. Based on the previous statement, what is the sample size in each group?

#### Answer to Q03:

Given the wording of the prompt, I'm assuming this test was conducted as an independent sample t-test ("In one group ... in a second group" instead of phrasing like, "... the group of students looked at colored words and then later looked at black and white words...").

The degrees of freedom for the t-test ran is given as 48 (t(48)). As this is an independent t-test, two parameters had to be estimated, the mean of the population from which group 1 was drawn, and the mean of the population from which group 2 was drawn. Therefore, we have the relationship

 $df = [Things\ we\ know\ (n_{total})] - [Estimated\ Parameters\ (n_{P,est})]$   $df = n_{total} - n_{P,est}$   $48 = n_{total} - 2$   $48 + 2 = n_{total}$   $50 = n_{total}$ 

Therefore, there were a total of 50 students in the study, with 25 in each group given that the prompt states the same number of students were in each group.

## Question 04 (Q04):

 $4.\ \,$  Visualize your data for this research question. Include your visualization here.

#### Answer to Q04:

This is my answer

### Question 05 (Q05):

5. Did student test scores improve significantly from the midterm to the final? Using RStudio to analyze, conduct a hypothesis test to evaluate this question. Organize your answer according to the 4 steps of hypothesis testing.

#### Answer to Q05:

This is my answer

## Question 06 (Q06):

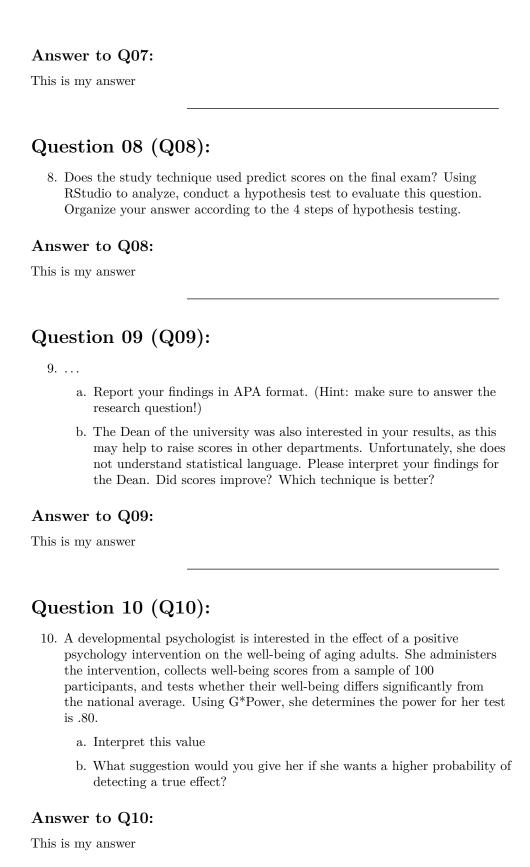
6. Report your findings in APA format. (Hint: make sure to answer the research question!)

#### Answer to Q06:

This is my answer

## Question 07 (Q07):

7. Visualize your data for this research question. Include your visualization here.



## Question 11 (Q11):

11. What would it mean if your analysis returned the following values? Consider the meaning of t - not the decision associated with it.

a. 
$$t(24) = 0.35$$

b. 
$$t(24) = 1.00$$

c. 
$$t(24) = 3.2$$

#### Answer to Q11:

This is my answer

## Question 12 (Q12):

12. Draw and annotate all the properties of the null and alternative curves: power, beta, alpha, type  $1~{\rm error}$ , type  $2~{\rm error}$ .

#### Answer to Q12:

This is my answer