

PSYC 240: Statistics in Psychology
PRACTICE SET 3: COMPARING MEANS

Short Essay Questions: Please provide a typewritten answer to the following essay questions:

- Describe the purpose of ANOVA and what it tells you about a set of data.
- Compare and contrast an independent samples t test to a Tukey's HSD test. When would you use each and why? If you ran each test on the same data, would the result (i.e., the p value) differ? If yes, why, and if not, why not?

Problem-Based Questions: Please show all work and clearly identify the final answer for each of the following questions.

- A researcher is interested in testing 3 cognitive techniques that could possibly help people increase their STM capacity. A total of 90 participants were randomly assigned to try 1 of 3 new cognitive techniques. Run an ANOVA on these data to test whether there are any significant differences among the 3 groups.

Group 1: ($M = 6.6$, $SD = 1.15$).
 Group 2: ($M = 7.5$, $SD = 0.49$).
 Group 3: ($M = 7.5$, $SD = 0.94$).

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups					
Within Groups					
Total					

- Fill in the ANOVA table below with the information provided ($k = 5$, $N = 163$).

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups				6.75	
Within Groups	825.67				
Total					

- A researcher is interested in deciding whether a new type of cognitive-behavioral therapy will work for patients with Major Depressive Disorder (MDD). Measurements of MDD were obtained on a scale ranging from 0 (normal) to 20 (very depressed). Ten participants are recruited and the data for their MDD scores are listed below. Run a statistical test to look for evidence that the new therapy decreases the severity of MDD.

Participant	Before Therapy	After Therapy	Participant	Before Therapy	After Therapy
1	17	13	6	15	12
2	20	19	7	16	13
3	14	16	8	18	11
4	16	15	9	19	17
5	17	14	10	17	17

4. Selective serotonin reuptake inhibitors (SSRIs) are a class of drugs that typically are used to treat mood and anxiety disorders. However, there are some side effects with these drugs, thus a newer class of drugs, called Serotonin-norepinephrine reuptake inhibitors (SNRIs) were developed. These drugs are designed to reduce the effects of the same disorders as well as OCD, ADHD, chronic pain, and other health problems. A study is conducted to test for the negative side effects of both types of drugs. One group of participants is told to take an SSRI and record the number of unpleasant symptoms they experience while another group does the same while taking an SNRI. Conduct the appropriate test, effect size, and compute the confidence interval of the difference between means.

SSRI group: $M = 3.57$, $SD = 2.72$, $n = 18$

SNRI group: $M = 2.31$, $SD = 2.55$, $n = 18$

5. What was the approximate power of the tests in problems 3 and 4?
6. The test conducted in Problem 3 was a pretest designed to fund a grant for a larger project based on this new therapy. Large government agencies like NIMH (National Institute of Mental Health) that fund research in this area often require information about the number of participants required to run the study in order to determine whether the researcher actually has the ability to conduct the proposed study. In order to determine the number of required participants, a power analysis is necessary. The proposed study is a two sample (i.e., independent samples) design, and the effect size is expected to be similar to that of the pretest. NIMH requires at least a power of .80, so how many participants should the researcher propose for the new study?