

Name: _____
MAT 222
Spring 2019
Homework 5

*“Sticks and stones may break your
bones, but words leave psychological
wounds that will never heal.”*

–Mr. Turner, Fairly Odd Parents

Problem 1: Researchers are trying to determine if students learn better from print textbooks or reading material from a digital screen. They test students two at a time, choosing equal ability students, giving them a short article to read (one student reading a printed version and the other reading a digital version), and then giving each identical exams to test their recall. The differences in the scores (print – digital) were

2, 3, -1, 0, -4, -1, 1, 1, 4, -3, 0, -1, 2, 0, 3, 3, -4, -2, 2.

- (a) What type of statistical test do you need to apply in this case? Justify your answer completely.
- (b) Find a 99% confidence interval for the difference of the scores. Summarize your results in a sentence.
- (c) State and test an appropriate hypothesis test using $\alpha = 0.05$. Be sure to state your test statistic, p -value, and conclusion.

Problem 2: Suppose you are testing

$$\begin{cases} H_0 : \mu = 110 \\ H_a : \mu < 110 \end{cases}$$

with significance level $\alpha = 0.10$. If $n = 28$, $\bar{x} = 99$, and $s = 7$, find

- (a) The probability of a Type I error.
- (b) The probability of a Type II error if $\mu = 105$.
- (c) The power of this test if $\mu = 105$.

Problem 3: To study the effectiveness of their weight loss programs, a local dieting center chooses 24 subjects who were at least 20% overweight to take part in a three month diet support program. The subjects were divided into three different programs: the first group received no support, the second group received phone support, and the third received in-person support. Private weightings determined each subjects weight at the beginning of the program and four months after the program's end. The data of the total weight loss from these three groups at the end of the experiment is summarized below.

Program	\bar{x}	s
1	11.3	4.33
2	7.2	11.201
3	14.1	4.87

- (a) Would a pooled t -test be appropriate to compare program one with program two? What about program two with program three? Justify your response.
- (b) Why might it be appropriate to use a pooled t -test to compared program one with program three? Justify your response.
- (c) Use a pooled t -test to construct a 96% confidence interval for the difference in the mean for program one and program three.
- (d) Use a pooled t -test to test the hypothesis that there is no difference between diet support and in-person diet support with a significance level of $\alpha = 0.3$. State your test statistic, p -value, and conclusion.

