

PSYC 2317: Statistical Methods for Psychology

Tarleton State University

Week 8 Homework

Fall 2019

For each of the hypothesis testing problems below, you need to justify your answer by explicitly defining your null hypothesis \mathcal{H}_0 and alternative hypothesis \mathcal{H}_1 and reporting an appropriate p -value range for the resulting test statistic.

1. A random sample of $N = 25$ individuals is selected from a population with $\mu = 20$, and a treatment is administered to each individual in the sample. After treatment, the sample mean is found to be $\bar{X} = 22.2$ with $SS = 384$. Based on the sample data, does the treatment have a significant effect?
2. To evaluate the effect of a treatment, a sample is obtained from a population with a mean of $\mu = 30$ and the treatment is administered to the individuals in the sample. After treatment, the sample mean is found to be $M = 31.3$ with a standard deviation of $\hat{\sigma} = 3$.
 - (a) If the sample consists of $N = 16$ individuals, are the data sufficient to conclude that the treatment has a significant effect?
 - (b) If the sample consists of $N = 36$ individuals, are the data sufficient to conclude that the treatment has a significant effect?
 - (c) Comparing your answers for parts (a) and (b), how does the size of the sample influence the outcome of a hypothesis test?
3. Standardized measures seem to indicate that the average level of anxiety has increased gradually over the past 50 years (Twenge, 2000). In the 1950s, the average score on the Child Manifest Anxiety Scale was $\mu = 15.1$. A sample of $N = 16$ of today's children produces a mean score of $\bar{X} = 23.3$ with $SS = 240$. Based on this sample, has there been a significant change in the average level of anxiety since the 1950s?
4. A sample of $N = 9$ individuals participates in a repeated measures study that produces a sample mean difference of $\bar{D} = 4.25$ with $SS = 128$ for the difference scores. Is this mean difference large enough to be considered a *significant increase*?
5. The following data are from a repeated measures study examining the effect of a treatment by measuring a group of $N = 6$ participants before and after they receive the treatment.

Before	After
7	8
2	9
4	6
5	7
5	6
3	8

Do these data show a significant treatment effect?