

STAT 8010–003 Statistical Methods I

Homework 4

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Due Date: October 25, 1:25pm

Problem 1

This data set, `InvisibilityCloak.csv`, provides the number of mischievous acts committed by two groups of people, those with and those without an invisibility cloak. The variables in this data set are:

- **Participant:** Identification number of a participant.
- **Cloak:** Experimental group (0 = without a cloak of invisibility, 1 = with a cloak of invisibility).
- **Mischief:** the number of mischievous acts committed by a participant.

Suppose a researcher would like to examine if invisibility cloak affects the number of mischievous acts committed.

- a. State the null and alternative hypotheses.
- b. Perform an appropriate test and state the assumption(s) for that test.
- c. What is the p-value of the test? What is the conclusion if $\alpha = 0.05$?

Problem 2

The data file, `Stereograms.csv`, records the time it took two groups of participants to see a figure hidden in a stereogram - one group received advance information about the scene, the other group did not. The variables in this data set are:

- `V1`: Participant number.
- `fuseTime`: the time (in seconds) it took the participant to see the hidden figure.
- `condition`: experimental condition (NV = without information, VV = with information).
- `logFuseTime`: the log transformation of the `fuseTime`.

Suppose a researcher would like to investigate whether providing advance information about the hidden figure shortens the time participant needs to see the figure.

- a. Should we use `fuseTime` or `logFuseTime` to perform a test. Justify your answer.
- b. State the null and alternative hypotheses.
- c. Perform an appropriate test and state the assumption(s) for that test.
- d. What is the p-value of the test? What is the conclusion if $\alpha = 0.05$?

Problem 3

The file `WeightGain.csv` contains data from a study where weights of 16 participants before and after an eight-week period of 1000 excessive calorie intake were recorded. The variables in this data set are:

- **Weight Before:** Weight in pounds (lb) measured before eight weeks of excessive calorie intake.
- **Weight After:** Weight in pounds (lb) measured after eight weeks of excessive calorie intake.
- **Difference: Weight After - Weight Before**

Suppose a researcher would like to investigate whether 1000 excess calorie intake per day over 8 weeks results in, on average, 16 pounds weight increase.

- Define the parameter(s) of interest and state the null and alternative hypotheses.
- Construct a 95% confidence interval for the average weight increase.
- What is the p-value of the test in a.? What is the conclusion if $\alpha = 0.05$?