

# HYPOTHESIS TESTING OF SINGLE MEAN AND SINGLE PROPORTION: PRACTICE 3\*

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## Abstract

This module provides a practice of Hypothesis Testing of Single Mean and Single Proportion as a part of Collaborative Statistics collection (col10522) by Barbara Illowsky and Susan Dean.

## 1 Student Learning Outcomes

- The student will explore the properties of hypothesis testing with a single proportion.

## 2 Given

The National Institute of Mental Health published an article stating that in any one-year period, approximately 9.5 percent of American adults suffer from depression or a depressive illness. (<http://www.nimh.nih.gov/publicat/depre>) Suppose that in a survey of 100 people in a certain town, seven of them suffered from depression or a depressive illness. Conduct a hypothesis test to determine if the true proportion of people in that town suffering from depression or a depressive illness is lower than the percent in the general adult American population.

## 3 Hypothesis Testing: Single Proportion

### Exercise 1

Is this a test of averages or proportions?

*(Solution on p. 3.)*

### Exercise 2

State the null and alternative hypotheses.

*(Solution on p. 3.)*

a.  $H_o$  :

b.  $H_a$  :

### Exercise 3

Is this a right-tailed, left-tailed, or two-tailed test? How do you know?

*(Solution on p. 3.)*

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**Exercise 4**

What symbol represents the Random Variable for this test?

*(Solution on p. 3.)***Exercise 5**

In words, define the Random Variable for this test.

*(Solution on p. 3.)***Exercise 6**

Calculate the following:

*(Solution on p. 3.)*

**a:**  $x =$

**b:**  $n =$

**c:**  $p\text{-hat} =$

**Exercise 7**

Calculate  $\sigma_x$ . Make sure to show how you set up the formula.

*(Solution on p. 3.)***Exercise 8**

State the distribution to use for the hypothesis test.

*(Solution on p. 3.)***Exercise 9**

Sketch a graph of the situation. Label the horizontal axis. Mark the hypothesized mean and the sample proportion,  $p\text{-hat}$ . Shade the area corresponding to the  $p\text{-value}$ .

**Exercise 10**

Find the  $p\text{-value}$

*(Solution on p. 3.)***Exercise 11**

At a pre-conceived  $\alpha = 0.05$ , what is your:

*(Solution on p. 3.)*

**a.** Decision:

**b.** Reason for the decision:

**c.** Conclusion (write out in a complete sentence):

**4 Discussion Question****Exercise 12**

Does it appear that the proportion of people in that town with depression or a depressive illness is lower than general adult American population? Why or why not?

## Solutions to Exercises in this Module

### Solution to Exercise 1 (p. 1)

Proportions

### Solution to Exercise 2 (p. 1)

- a.  $H_o : p = 0.095$
- b.  $H_a : P < 0.095$

### Solution to Exercise 3 (p. 1)

left-tailed

### Solution to Exercise 4 (p. 2)

P-hat

### Solution to Exercise 5 (p. 2)

the proportion of people in that town suffering from depression or a depressive illness

### Solution to Exercise 6 (p. 2)

- a. 7
- b. 100
- c. 0.07

### Solution to Exercise 7 (p. 2)

0.0293

### Solution to Exercise 8 (p. 2)

Normal

### Solution to Exercise 10 (p. 2)

0.1969

### Solution to Exercise 11 (p. 2)

- a. Do not reject the null hypothesis