Hypothesis Testing: Two Population Means and Two Population Proportions: Practice 1*

Susan Dean
Barbara Illowsky, Ph.D.

Abstract

This module provides a practice of Two Population Means and Two Population Proportions 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 two proportions.

2 Given

In the 2000 Census, 2.4 percent of the U.S. population reported being two or more races. However, the percent varies tremendously from state to state. (http://www.census.gov/prod/2001pubs/c2kbr01-6.pdf) Suppose that two random surveys are conducted. In the first random survey, out of 1000 North Dakotans, only 9 people reported being of two or more races. In the second random survey, out of 500 Nevadans, 17 people reported being of two or more races. Conduct a hypothesis test to determine if the population percents are the same for the two states or if the percent for Nevada is statistically higher than for North Dakota.

3 Hypothesis Testing: Two Proportions

Exercise 1 *(Solution on p. 3.)*

Is this a test of averages or proportions?

Exercise 2 *(Solution on p. 3.)*

State the null and alternative hypotheses.

a. H_0 :
b. H_a :

*Version 1.10: Nov 16, 2010 10:13 am US/Central
†http://creativecommons.org/licenses/by/3.0/

Exercise 3 *(Solution on p. 3.)*
Is this a right-tailed, left-tailed, or two-tailed test? How do you know?

Exercise 4
What is the Random Variable of interest for this test?

Exercise 5
In words, define the Random Variable for this test.

Exercise 6 *(Solution on p. 3.)*
Which distribution (Normal or student-t) would you use for this hypothesis test?

Exercise 7
Explain why you chose the distribution you did for the above question.

Exercise 8 *(Solution on p. 3.)*
Calculate the test statistic.

Exercise 9
Sketch a graph of the situation. Label the horizontal axis. Mark the hypothesized difference and the sample difference. Shade the area corresponding to the $p-$value.

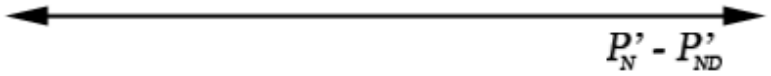

Figure 1

Exercise 10 *(Solution on p. 3.)*
Find the $p-$value:

Exercise 11 *(Solution on p. 3.)*
At a pre-conceived $\alpha = 0.05$, what is your:

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 Nevadans who are two or more races is higher than the proportion of North Dakotans? 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_0:PN=PND

a. H_a:PN> PND

Solution to Exercise 3 (p. 2)
right-tailed
Solution to Exercise 6 (p. 2)
Normal
Solution to Exercise 8 (p. 2)
3.50
Solution to Exercise 10 (p. 2)
0.0002
Solution to Exercise 11 (p. 2)

a. Reject the null hypothesis