

P Chapter 10 Projects

Project A: Hypothesis Testing for Population Means

Choose one of the three claims, collect data from members of the appropriate population, and perform a hypothesis test to determine if the evidence supports the claim or does not support the claim. After you have written your conclusion, look at the “real” value of the population mean (given below) and determine if your hypothesis test produced a correct decision, a Type I error, or a Type II error.

Pick one of the following claims to test:

Claim 1: Parents of college freshmen believe that freshmen spend a mean of at most \$50 per week on eating out.

Claim 2: It is believed that college sophomores see at least 4 movies per month at the theater.

Claim 3: The librarian claims that college juniors visit the library twice a week.

Step 1: State the null and alternative hypotheses.

Based on the claim you chose, what are the null and alternative hypotheses?

Step 2: Determine which distribution to use for the test statistic, and state the level of significance.

In the next step, you will collect data from 10 students. Assuming that the population distribution is approximately normal, what formula should be used for the test statistic? Also, choose a level of significance of 0.10, 0.05, or 0.01.

Step 3: Gather data and calculate the necessary sample statistics.

Collect data from 10 students who are in the appropriate population. Discuss which method of data collection you used. List any potential for bias. Calculate the sample mean and sample standard deviation.

Calculate the test statistic using the values you just calculated from your sample.

Step 4: Draw a conclusion and interpret the decision.

Determine the type of your hypothesis test: left-tailed, right-tailed, or two-tailed.

Draw a picture of your rejection region.

What is your conclusion?

Interpret your decision.

Types of Errors

Let's assume we find out that the truths are as follows.

- Freshmen spend a mean of \$40 per week eating out.
- The mean number of movies seen by sophomores at the theater each month is more than 4.
- The mean number of times per week that juniors visit the library is 4.

Based on your conclusion, did you make a Type I error, a Type II error, or a correct decision? Explain.

Project B: Chi-Square Test for Goodness of Fit

In this project, we will look at whether the makeup of your institution has changed significantly from Year 1 to Year 2, for two nonconsecutive years. In other words, are the percentages of students in every classification in Year 2 equal to the percentages of students in every classification in Year 1? Let's begin by collecting some data from the earlier academic year to determine the hypotheses for the more recent academic year.

1. Choose two years that are not consecutive from which to collect data. (For instance, you may choose the current academic year for Year 2 and the academic year four years earlier for Year 1.) Find out the number of students who were enrolled at your institution for each classification during Year 1 and enter them in a table like the one below.

	Year 1
Number of Freshmen Enrolled	
Number of Sophomores Enrolled	
Number of Juniors Enrolled	
Number of Seniors Enrolled	
Total Number of Students Enrolled	

2. Now calculate the percentage of students in each category during Year 1 and enter them in a new table.

	Year 1
Percentage of Freshmen Enrolled	
Percentage of Sophomores Enrolled	
Percentage of Juniors Enrolled	
Percentage of Seniors Enrolled	

3. State the null and alternative hypotheses in words.
4. Specify the null and alternative hypotheses with mathematical symbols.
5. Now let's gather data for Year 2. Find out the number of students enrolled at your institution for each classification during Year 2 and enter them in a table like the one below.

	Year 2
Number of Freshmen Enrolled	
Number of Sophomores Enrolled	
Number of Juniors Enrolled	
Number of Seniors Enrolled	
Total Number of Students Enrolled	

6. Now calculate the percentage of students in each category during Year 2 and enter them in a new table.

	Year 2
Percentage of Freshmen Enrolled	
Percentage of Sophomores Enrolled	
Percentage of Juniors Enrolled	
Percentage of Seniors Enrolled	

7. Calculate the expected value for each classification.

	Expected Values
Number of Freshmen Enrolled	
Number of Sophomores Enrolled	
Number of Juniors Enrolled	
Number of Seniors Enrolled	

8. Calculate the test statistic.
9. Determine your conclusion.
10. Is there sufficient evidence to conclude at $\alpha = 0.10$ that the makeup of your institution has significantly changed between Year 1 and Year 2? Explain.