

1. A recent report stated that 68% of the American population belongs to a religious community (church, synagogue, etc.). In a sample of 1000 Michigan residents, 720 indicated that they belong to a religious community. Is there evidence to support the claim that the proportion of all Michigan residents who belong to a religious community is different than 68%? Use $\alpha = 0.10$.
- State the null and alternative hypotheses. Indicate the claim and whether a left-tailed, right-tailed, or two tailed test will be used.
 - Which sampling distribution will be used? What is the value of the test statistic?
 - Find the p-value. Sketch the sampling distribution and show the area corresponding to the p-value.
 - Will you reject or fail to reject the null hypothesis?
 - State the conclusion.

2. Students investigating the packaging of tortilla chips purchased 10 bags of chips marked with a net weight of 24 ounces. They carefully weighed the contents of each bag, recording the following weights (in ounces):

23.3 23.2 23.1 23.1 23.3 23.6 24.2 24.0 24.1 24.0

Is the manufacturer underfilling the bags? Test the claim that the average weight of all similar bags of chips is less than 24 ounces. Use $\alpha = 0.10$.

a. State the null and alternative hypotheses. Indicate the claim and whether a left-tailed, right-tailed, or two tailed test will be used.

b. Which sampling distribution will be used? What is the value of the test statistic?

c. Find the p-value. Sketch the sampling distribution and show the area corresponding to the p-value.

d. Will you reject or fail to reject the null hypothesis?

e. State the conclusion.

3. In 1960, census results indicated that the age at which American men first married had a mean of 23.3 years. Suppose a researcher wants to find out if the mean age of first marriage has increased since then. She takes a sample of 25 men, and finds that these men married at an average age of 28.2. The sample standard deviation is 5.3 years. Test the claim that the mean age of first marriage is greater than 23.3 years. Use $\alpha = 0.05$.

a. State the null and alternative hypotheses. Indicate the claim and whether a left-tailed, right-tailed, or two-tailed test will be used.

b. Which sampling distribution will be used? What is the value of the test statistic?

c. Find the p-value. Sketch the sampling distribution and show the area corresponding to the p-value.

d. Will you reject or fail to reject the null hypothesis?

e. State the conclusion.

4. A researcher estimates that the mean waste recycled by adults in the United States is more than 1 pound per person per day. A random sample of 30 adults is selected. For the sample, the mean waste recycled per person per day is 1.05 pounds. Suppose the population standard deviation is known to be 0.3 pound. At a 5% level of significance, is there enough evidence to support the researcher's claim?

a. State the null and alternative hypotheses. Indicate the claim and whether a left-tailed, right-tailed, or two tailed test will be used.

b. Which sampling distribution will be used? What is the value of the test statistic?

c. Find the p-value. Sketch the sampling distribution and show the area corresponding to the p-value.

d. Will you reject or fail to reject the null hypothesis?

e. State the conclusion.

5. When a new drug is formulated, the pharmaceutical company must subject it to lengthy and involved testing before receiving the necessary permission from the Food and Drug Administration (FDA) to market the drug. The FDA requires the pharmaceutical company to provide substantial evidence that the new drug is safe for potential consumers.

a. If the new drug testing were to be placed in a test of hypothesis framework, would the null hypothesis be that the drug is safe or unsafe? The alternative hypothesis?

b. Given the choice of null and alternative hypothesis in part a, describe Type I and Type II errors in terms of this application.