

Chapter 5: Hypothesis Test (cont.)

1. Consider the following hypothesis test:

$$H_0: \mu = 15$$

$$H_a: \mu \neq 15$$

A sample of 50 provided a sample mean of 14.15. The population standard deviation is 3.

- a. Compute the value of the test statistic.
- b. What is the p-value?
- c. At $\alpha = 0.05$, what is your conclusion?
- d. What is the rejection rule using the critical value? What is your conclusion?

2. Consider the following hypothesis test:

$$H_0: \mu = 22$$

$$H_a: \mu \neq 22$$

A sample of 75 is used and the population standard deviation is 10. Compute the p-value and state your conclusion for each of the following sample results. Use $\alpha = 0.01$.

a. $\bar{x} = 23$

b. $\bar{x} = 21.5$

c. $\bar{x} = 20$

3. Individuals filing federal income tax returns prior to March 31 received an average refund of \$1,056. Consider the population of “last-minute” filers who mail their tax return during the last five days of the income tax period (typically April 10 to April 15).
- A researcher suggests that a reason individuals wait until the last five days is that on average these individuals receive lower refunds than do early filers. Develop appropriate hypothesis such that rejection of H_0 will support the researcher’s contention.
 - For a sample of 400 individuals who filed a tax return between April 10 and 15, the sample mean refund was \$910. Based on prior experience a population standard deviation of $\sigma = \$1600$ may be assumed. What is the p-value?
 - At $\alpha = 0.05$, what is your conclusion?
 - Repeat the preceding hypothesis test using the critical value approach.

4. Reis, Inc., a New York real estate research firm, tracks the cost of apartment rentals in the United States. In mid-2002, the nationwide mean apartment rental rate was \$895 per month. Assume that, based on the historical quarterly surveys, a population standard deviation of $\sigma = \$225$ is reasonable. In a current study of apartment rental rates, a sample of 180 apartments nationwide provided a sample mean of \$915 per month. Do the sample data enable Reis to conclude that the population mean apartment rental rate now exceeds the level reported in 2002?
- State the null and alternative hypotheses.
 - What is the p-value?
 - At $\alpha = 0.01$, what is your conclusion?
 - What would you recommend Reis consider doing at this time?

5. The average annual total return for U.S. Diversified Equity mutual funds from 1999 to 2003 was 4.1%. A researcher would like to conduct a hypothesis test to see whether the returns for mid-cap growth funds over the same period are significantly different from the average for U.S.

Diversified Equity funds.

- a. Formulate the hypotheses that can be used to determine whether the mean annual return for mid-cap growth funds differ from the mean for U.D. Diversified Equity funds.
- b. A sample of 40 mid-cap growth funds provides a mean return of $\bar{x} = 3.4\%$. Assuming the population standard deviation for mid-cap growth fund is known from previous studies to be $\sigma = 2\%$, and use the sample results to compute the test statistic and p-value for the hypothesis test.
- c. At $\alpha = 0.05$, what is your conclusion?

6. The national mean sales price for new one-family homes is \$181,900. A sample of 40 one-family home sales in the South showed a sample mean of \$166,400. Use a population standard deviation of \$33,500.
- Formulate the null and alternative hypotheses that can be used to determine whether the sample data support the conclusion that the population mean sales price for new one-family homes in the South is less than the national mean of \$181,900.
 - What is the value of the test statistic?
 - What is the p-value?
 - At $\alpha = 0.01$, what is your conclusion?