

In Section 8-2 we presented the basic components of a hypothesis test: null hypothesis, alternative hypothesis, test statistic, critical region, significance level, critical value, P -value, type I error, and type II error. We also discussed two-tailed tests, left-tailed tests, right-tailed tests, and the statement of conclusions. We used those components in identifying three different methods for testing hypotheses:

1. The P -value method (summarized in Figure 8-1)
2. The critical value method (or traditional method) summarized in Figure 8-2
3. Confidence intervals (Chapter 7)

In Sections 8-3 through 8-5 we discussed specific methods for dealing with different parameters. Because it is so important to select the correct distribution and test statistic, we provide Table 8-4, which summarizes some key elements of the hypothesis-testing procedures of this chapter.

Table 8-4 Hypothesis Tests

Parameter	Requirements: Simple Random Sample and ...	Distribution and Test Statistic	Critical and P -values
Proportion	$np \geq 5$ and $nq \geq 5$	Normal: $z = \frac{\hat{p} - p}{\sqrt{\frac{pq}{n}}}$	Table A-2
Mean	σ not known and normally distributed population or σ not known and $n > 30$	Student t : $t = \frac{\bar{x} - \mu_x}{\frac{s}{\sqrt{n}}}$	Table A-3
	σ known and normally distributed population or σ known and $n > 30$	Normal: $z = \frac{\bar{x} - \mu_x}{\frac{\sigma}{\sqrt{n}}}$	Table A-2
	Population not normally distributed and $n \leq 30$	Use a nonparametric method or bootstrapping.	
Standard Deviation or Variance	Population normally distributed	Chi-square: $\chi^2 = \frac{(n-1)s^2}{\sigma^2}$	Table A-4

Chapter Quick Quiz

1. Wristwatch Accuracy Students of the author collected a simple random sample of times (sec) of wristwatch errors, and a few of those times are listed below. Negative values correspond to watches that are running ahead of the actual time. Assuming that we want to use a 0.05 significance level to test the claim that the sample is from a population with a mean equal to 0 sec, identify the null hypothesis and the alternative hypothesis.

140 -85 325 20 305 205 20 -93

2. Type of Test Refer to the hypothesis test described in Exercise 1.

- a. Is the hypothesis test left-tailed, right-tailed, or two-tailed?
- b. If the requirements are satisfied, what distribution should be used for the hypothesis test: normal, Student t , chi-square, binomial?

3. P -Value If we use technology to conduct the hypothesis test described in Exercise 1, we get a P -value of 0.1150.

- a. What should we conclude about the null hypothesis?
- b. What is the final conclusion that addresses the original claim?