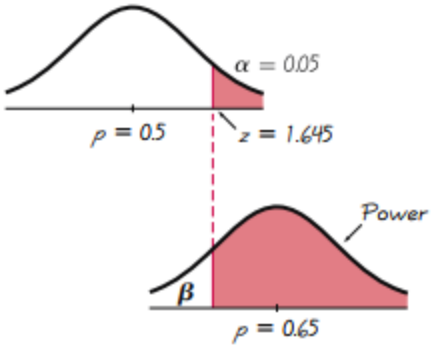
8-2 Beyond the Basics

35. Interpreting Power Chantix tablets are used as an aid to help people stop smoking. In a clinical trial, 129 subjects were treated with Chantix twice a day for 12 weeks, and 16 subjects experienced abdominal pain (based on data from Pfizer, Inc.). If someone claims that more than 8% of Chantix users experience abdominal pain, that claim is supported with a hypothesis test conducted with a 0.05 significance level. Using 0.18 as an alternative value of p, the power of the test is 0.96. Interpret this value of the power of the test.

36. Calculating Power Consider a hypothesis test of the claim that the MicroSort method of gender selection is effective in increasing the likelihood of having a baby girl, so that the claim is $p > 0.5$. Assume that a significance level of $\alpha = 0.05$ is used, and the sample is a simple random sample of size $n = 64$.

a. Assuming that the true population proportion is 0.65, find the power of the test, which is the probability of rejecting the null hypothesis when it is false. (*Hint:* With a 0.05 significance level, the critical value is $z = 1.645$, so any test statistic in the right tail of the accompanying top graph is in the rejection region where the claim is supported. Find the sample proportion $\hat{p}$ in the top graph, and use it to find the power shown in the bottom graph.)



b. Explain why the red-shaded region of the bottom graph represents the power of the test.

37. Finding Sample Size to Achieve Power Researchers plan to conduct a test of a gender-selection method. They plan to use the alternative hypothesis of $H_1: p > 0.5$ and a significance level of $\alpha = 0.05$. Find the sample size required to achieve at least 80% power in detecting an increase in p from 0.5 to 0.55. (This is a very difficult exercise. *Hint:* See Exercise 36.)

8-3 Testing a Claim About a Proportion

Key Concept Section 8-2 presented individual components of a hypothesis test, and this section presents complete procedures for testing a hypothesis (or claim) made about a population proportion p. We illustrate hypothesis testing with the P-value method, the critical value method, and the use of confidence intervals. The methods of this section can be used with claims about population proportions, and the same methods can be used for testing claims about probabilities or the decimal equivalents of percents.

Two different approaches for testing a claim about a population proportion are (1) to use a normal distribution as an approximation to the binomial distribution, and (2) to use an exact method based on the binomial probability distribution. Part 1 of this section uses the approximation method with the normal distribution, and Part 2 of this section briefly describes the exact method.

Part 1: Basic Methods of Testing Claims About a Population Proportion p

The following box includes the key elements used for testing a claim about a population proportion.