19. Clinical Trial of Lipitor Lipitor is the trade name of the drug atorvastatin, which is used to reduce cholesterol in patients. (Until its patent expired in 2011, this was the largest-selling drug in the world, with annual sales of $13 billion.) Adverse reactions have been studied in clinical trials, and the table below summarizes results for infections in patients from different treatment groups (based on data from Parke-Davis). Use a 0.01 significance level to test the claim that getting an infection is independent of the treatment. Does the atorvastatin treatment appear to have an effect on infections?

	Placebo	Atorvastatin 10 mg	Atorvastatin 40 mg	Atorvastatin 80 mg
Infection	27	89	8	7
No Infection	243	774	71	87

20. Genetics and Handedness In a study of left-handedness as a possible inherited trait, the data in the table below were obtained (based on data from "Why Are Some People Left-Handed? An Evolutionary Perspective," by Laurens and Faurie, *Philosophical Transactions,* Vol. 364). Use a 0.01 significance level to test the claim that left-handedness is independent of parental handedness. What do the results suggest about the inheritability of left-handedness?

Parental Handedness	Offspring Left-Handed?	
Father/Mother	Yes	No
Right/Right	5360	50,928
Right/Left	767	2736
Left/Right	741	3667
Left/Left	94	289

11-3 Beyond the Basics

21. Equivalent Tests A χ^2 test involving a 2×2 table is equivalent to the test for the difference between two proportions, as described in Section 9-2. Using the claim and table in Example 4, verify that the χ^2 test statistic and the z test statistic (found from the test of equality of two proportions) are related as follows: $z^2 = \chi^2$. Also show that the critical values have that same relationship.

22. Using Yates's Correction for Continuity The chi-square distribution is continuous, whereas the test statistic used in this section is discrete. Some statisticians use *Yates's correction for continuity* in cells with an expected frequency of less than 10 or in all cells of a contingency table with two rows and two columns. With Yates's correction, we replace

$$\sum \frac{(O - E)^2}{E} \quad \text{with} \quad \sum \frac{(|O - E| - 0.5)^2}{E}$$

Given the contingency table in Example 4, find the value of the χ^2 test statistic using Yates's correction. What effect does Yates's correction have?

Chapter 11 Review

The two sections of this chapter both involve applications of the χ^2 distribution to categorical data consisting of frequency counts. In Section 11-2 we described methods for using frequency counts from different categories for testing goodness-of-fit with some claimed distribution. The test statistic given below is used in a right-tailed test in which the χ^2 distribution has $k - 1$ degrees of freedom, where k is the number of categories. This test requires that each of the expected frequencies must be at least 5.