*The remaining exercises concern larger tables that require software for easy analysis. In many cases, you should follow the* ***Plan, Solve***, *and* ***Conclude*** *steps of the four-step process in your answers*.

**25.42 Smokers rate their health**. The University of Michigan Health and Retirement Study (HRS) surveys more than 22,000 Americans over the age of 50 every two years. A subsample of the Health and Retirement Study (HRS) participated in the 2009 Internet-based survey that collected information on a number of topical areas, including health (physical and mental, health behaviors); psychosocial items; economics (income, assets, expectations, and consumption); and retirement.**24** Two of the questions asked on the Internet survey were, “Would you say your health is excellent, very good, good, fair, or poor?” and “Do you smoke cigarettes now?” The two–way table summarizes the answers on these two questions.



(a)Regarding the HRS Internet survey as approximately an SRS of Americans over the age of 50, give a 99% confidence interval for the proportion of Americans over the age of 50 who are current smokers.

(b)Compare the conditional distributions of self-evaluation of health for current smokers and nonsmokers using both a table and a graph. What are the most important differences?

(c)Carry out the chi-square test for the hypothesis of no difference between the self-evaluation of health for current smokers and nonsmokers. What would be the mean of the test statistic if the null hypothesis were true? The value of the statistic is so far above this mean that you can see at once that it must be highly significant. What is the approximate *P*-value?

(d)Look at the terms of the chi-square statistic and compare observed and expected counts in the cells that contribute the most to chi-square. Based on this and your findings in part (b), write a short comparison of the differences in self-evaluation of health for current smokers and nonsmokers.

**25.43 Who goes to religious services?** The General Social Survey (GSS) asked this question: “Have you attended religious services in the last week?” Here are the responses for those whose highest degree was highschoolor above:

 (a)Carry out the chi-square test for the hypothesis of no relationship between the highest degree attained and attendance at religious services in the last week. What do you conclude?

(b)Make a 2 × 3 table by omitting the column corresponding to those whose highest degree was high school. Carry out the chi-square test for the hypothesis of no relationship between the type of advanced degree attained and attendance at religious services in the last week. What do you conclude?

(c)Make a 2 × 2 table by combining the counts in the three columns that have a highest degree beyond high school, so that you are comparing adults whose highest degree was high school against those whose highest degree was beyond high school. Carry out the chi-square test for the hypothesis of no relationship between attaining a degree beyond high school and attendance at religious services for this 2 × 2 table. What do you conclude?

(d)Using the results from these three chi-square tests, write a short report explaining the relationship between attendance at religious services in the last week and the highest degree attained. As part of your report, you should give the percentages who attended religious services for each of the four highest degrees.

**25.47 Bring your kids to the Monterey Bay Aquarium!** The Monterey Bay Aquarium, founded in 1984, is situated on the beautiful coast of Monterey Bay in the historic Cannery Row district of Monterey, California. Each year, the aquarium interviews a random sample of visitors as they exit the museum. The survey includes visitor demographic information, use of social media, and opinions on their aquarium visit. For each visitor sampled during the summer months of June, July, and August, here is the distribution of the number of children in their group in each year during 2009–13:**28**



How has the distribution of the number of children in the group changed over this five year period? Are the differences significant? One of the Aquarium’s strategic goals is to attract a younger audience, including more families and intergenerational groups. Does it appear that they are meeting their goal? Explain.