Stat 401 Homework 7: Due Thursday, Nov. 2 by 1:40pm

General Instructions: Most homeworks will consist of a set of problems from the textbook, plus additional problems or data analyses. Turn in a physical copy of your homework at the beginning of class (or earlier) on the due date. For problems that require the use of R, include relevant and well-labeled R code and output with the problem. Additional R code and output may be included in an appendix.

Open Intro Exercises

- Exercise 6.50 on p. 326. For both (a) and (b), calculate the expected counts and chi-squared statistic by hand, showing your work; use the `pchisq` function in R to find the p-value. (You may check your answers using the `chisq.test` function in R.)

Additional Problems

1. Exercise 2 from Lab 8:

   You may use the `chisq.test` function for your test calculations in part 3. of the exercise.

2. In murder trials in 20 Florida counties during 1976 and 1977, the death penalty was given in 19 out of 151 cases in which a white killed a white, in 0 out of 9 cases in which a white killed a black, in 11 out of 63 cases in which a black killed a white, and in 6 out of 103 cases in which a black killed a black (M. Radelet, Am. Sociol. Rev., 46: 918?927, 1981).

   (a) Ignoring the race of the victim, create a 2×2 table of frequencies where the rows are defendant’s race and the columns are the death penalty verdict.
   
   (b) Calculate the relative risk of the death penalty for black defendants compared to white defendants. Write a sentence interpreting this statistic in context of the problem.
   
   (c) Calculate the odds ratio of the death penalty for black defendants compared to white defendants. Write a sentence interpreting this statistic in context of the problem.
   
   (d) If we were to test the null hypothesis that the defendant’s race and the death penalty verdict were independent, versus the alternative hypothesis that the two variables are dependent, how would we write $H_0$ and $H_a$ in terms of the true relative risk of the death penalty for black defendants compared to white defendants?
   
   (e) Use R to carry out a randomization test for these set of hypotheses, but using relative risk as your statistic rather than a difference in proportions. Report your R code and output, the p-value, your decision, and a conclusion in context of the problem. You may want to review Lab 5:
(f) Now subset the data according to the victim’s race. Create a $2\times2$ table of defendant’s race versus death penalty verdict when the victim was white, and create a separate $2\times2$ table of defendant’s race versus death penalty verdict when the victim was black. Is this an example of Simpson’s Paradox? Explain why this happened. Hint: It will help to calculate other marginal proportions – what proportion of white defendants had white victims? what proportion of black defendants had black victims? what proportion of cases where the victim was white resulted in the death penalty? when the victim was black?