

**Introduction to Quantitative Methods**  
**Homework 6 (for Week 7)**  
**Due: 18 March 2010**

1. Answer the following:

A researcher is interested in finding out if college-bound high school students tend to smoke cigarettes less than high school students who are not college-bound. He distributes a questionnaire and finds that for a group of 57 college-bound students the mean number of cigarettes smoked per week is  $\bar{X}_1 = 4.0$ , with a standard deviation of  $s_1 = 2.0$ . For 36 non-college-bound students, he finds that the mean number of cigarettes smoked per week is  $\bar{X}_2 = 9.0$ , with a standard deviation of  $s_2 = 3.0$ . Using these results, test the null hypothesis of no difference between college-bound and non-college-bound high school students with respect to smoking. What does the outcome of this test indicate?

2. Answer the following, using the "long" way, step by step computing each quantity as from the extended examples in L&F and from the extended example in class. You can do this any way you wish (with R, with Excel, with your calculator and pencil, etc.)

A criminologist was interested in whether there was any disparity in sentencing based on the race of the defendant. She selected at random 18 burglary convictions and compared the prison terms given to the 10 whites and 8 blacks sampled. The sentence lengths (in years) are shown for the white and black offenders. Using these data, test the null hypothesis that whites and blacks convicted of burglary in this jurisdiction do not differ with respect to prison sentence length.

Whites: 3, 6, 5, 6, 3, 5, 2, 8, 5, 4  
Blacks: 4, 8, 7, 3, 5, 4, 5, 4

3. Answer the following, using R with the commands learned in class (e.g. `t.test()`).

In a field experiment on the effects of perceived control, residents on one floor of a nursing home were given opportunities for increased control in their lives (for example, arrange their own furniture, decide how to spend free time, choose and take care of a plant), whereas the residents on another floor were treated as usual. That is, the staff took care of these details. The feelings of well-being (on a 21-point scale) follow for the conditions of increased and no increased control. Using these data, test the null hypothesis that this minimal manipulation of perception of control had no effect on the residents' feelings of well-being.

No

Increased Control: (6, 9, 10, 14, 11)  
No increased control: (8, 7, 9, 12, 14)

4. Answer the following:

A social psychologist was interested in sex differences in the sociability of teenagers. Using the number of good friends as a measure, he compared the sociability of eight female and seven male teenagers. Test the null hypothesis of no difference with respect to sociability between females and males. What do your results indicate?

Females: (8, 3, 1, 7, 7, 6, 8, 5)  
Males: (11, 9, 5, 12, 8, 4, 6)

5. A researcher is interested in gender differences in turnout. Polling a sample of 190 men and 135 women, the researcher finds that 46% of the men turned out to vote and 52% of the women turned out to vote. Test the statistical significance of the difference in sample proportions. (You can use the R procedure for testing proportions to answer this question.)

Extra credit, max 15 points: Test the null hypothesis of no difference for Question 4 using a method other than a  $t$ -test. Why might you use a non-parametric alternative to the  $t$ -test, what is this test, and do its results differ from the  $t$ -test?