

## Choosing the Correct Procedure: Examples

The following will be discussed in class. You have been asked to serve as a statistical consultant for several proposed projects. For each of the following, indicate which of the cases we have studied the problem falls under (e.g. one sample tests, case I,  $\sigma$  known; nonparametric tests, case II, tests of association). Briefly explain why. Then go through the first three steps of our hypothesis testing procedure. State

(i) the null and alternative hypotheses

(ii) the appropriate test statistic; if necessary, also indicate what the degrees of freedom are

(iii) the acceptance region. If the significance level is not explicitly stated, use  $\alpha = .05$ .

1. An advertiser wants to test (using  $\alpha = .01$ ) a magazine publisher's claim that 25% of the magazine's readers are college students. A random sample of 200 subscribers is to be taken.
2. A police chief wants to test whether, on average, the incidence of crime is the same in four city districts. The number of police calls received from each district in each of the last 30 days is to be used as a sample. (Note that  $n = 4 * 30 = 120$ .)
3. A researcher is interested in whether severity of accident and location of accident are related. He plans to draw a sample of 100 accident records. In the accident records, severity is coded as either (1) property damage, (2) injury, or (3) fatality. The three possible locations for accidents are freeway, rural road, or city road.
4. A psychologist wants to test whether age influences IQ. A random sample of 60 45 year olds, whose IQ score at age 20 is known, is to be taken.

5. The mayor wants to know whether mean apartment rents are now higher than last year's \$375 per month. A random sample of 20 of the town's apartments is to be taken. The desired significance level is  $\alpha = .01$ . It is assumed that the current population standard deviation is the same as last year,  $\sigma = \$25$ .
  
6. A pollster believes that voters are evenly divided in their support for 6 candidates. To test her idea, she plans to poll 200 people and ask them which of the 6 candidates they are most likely to vote for.
  
7. The Notre Dame administration wants to get a better understanding of alcohol consumption on campus. Five hundred students will be surveyed. The administration will see whether the amount of alcohol consumed (measured in ounces) differs by gender (male, female) and race (white, nonwhite).
  
8. A quality inspector wants to test the claim that the proportion of acceptable electronics components delivered by a foreign supplier (A) is lower than that coming from a domestic supplier (B). Random samples of  $n_A = 100$  and  $n_B = 150$  are to be taken from incoming shipments and tested; the desired significance level is  $\alpha = .01$ .
  
9. An economist wants to test the claim that the wages of construction workers in New York (A) are different from those in Chicago (B). Random samples of workers,  $n_A = 200$  and  $n_B = 100$ , are to be taken. The economist wants to use  $\alpha = .01$ . She assumes the populations are normally distributed and have equal variances.