Homework 6 (Due on March 7)

February 28, 2013 STA 5172

Problem I

One method for assessing the bioavailability of a drug is to note its concentration in blood and/or urine samples at certain periods of time after the drug is given. Suppose we want to compare the concentrations of two types of aspirin (types A and B) in urine specimens taken from the same person 1 hour after he or she has taken the drug. Hence, a specific dosage of either type A or type B aspirin is given at one time and the 1-hour urine concentration is measured. One week later, after the first aspirin has presumably been cleared from the system, the same dosage of the other aspirin is given to the same person and the 1-hour urine concentration is noted. Because the order of giving the drugs may affect the results, a table of random numbers is used to decide which of the two types of aspirin to give first. This experiment is performed on 10 people; the results are given in Table 8.15. Suppose

Table 8.15 Concentration of aspirin in urine samples

Person	Aspirin A 1-hour concentration (mg%)	Aspirin B 1-hour concentration (mg%)
1	15	13
2	26	20
3	13	10
4	28	21
5	17	17
6	20	22
7	7	5
8	36	30
9	12	7
10	18	11
Mean	19.20	15.60
sd	8.63	7.78

we want to test the hypothesis that the mean concentrations of the two drugs are the same in urine specimens.

1. What are the appropriate hypotheses?
2. What are the appropriate procedures to test these hypotheses?
3. Conduct the tests mentioned in part (ii).

4. What is the best point estimate of the mean difference in concentrations between the two drugs?

5. What is a 95% CI for the mean difference?

6. Suppose an α level of 0.05 is used for the test in part 3. What is the relationship between the decision reached with the test procedure in part 2. and the nature of the CI in part 5. ?

Problem II

A 1980 study was conducted whose purpose was to compare the indoor air quality in offices where smoking was permitted with that in offices where smoking was not permitted. Measurements were made of carbon monoxide (CO) at 1:20 p.m. in 40 work areas where smoking was permitted and in 40 work areas where smoking was not permitted. Where smoking was permitted, the mean CO level was 11.6 parts per million (ppm) and the standard deviation CO was 7.3 ppm. Where smoking was not permitted, the mean CO was 6.9 ppm and the standard deviation CO was 2.7 ppm.

1. Test for whether the standard deviation of CO is significantly different in the two types of working environments.

2. Test for whether or not the mean CO is significantly different in the two types of working environments.

3. Provide a 95% CI for the difference in mean CO between the smoking and nonsmoking working environments.