# STA 580 — Spring 2009 — Dr. Charnigo

## Written Assignment 4

This assignment is due on Thursday 02 April at 5:20 p.m. You may work in self-selected groups of two or three, in which case you may hand in one copy of the assignment for the group.

[20] 1. Refer to "Sexually Transmitted Disease" and Table 10.26 on pages 450 and 451. Let $p_1$ denote the probability of a positive test (smear or culture) for someone receiving penicillin. Let $p_2$ denote the probability of a positive test for someone receiving spectinomycin (low dose or high dose).

[10] a. Test $H_0 : p_1 = p_2$ against $H_1 : p_1 \neq p_2$ at level $\alpha = 0.05$ by calculating a $z$ statistic based on the difference in sample proportions.

[10] b. Test $H_0 : p_1 = p_2$ against $H_1 : p_1 \neq p_2$ at level $\alpha = 0.05$ by calculating a $\chi^2$ statistic based on the disparities between expected and observed values in a two-by-two contingency table.

[40] 2. Refer to "Infectious Disease" on page 380 and Table 2.11 on page 38. Use $\alpha = 0.05$ for all hypothesis tests.

[10] a. Create boxplots of the white blood count measurements in the two service groups (medical and surgical), one boxplot for each group. Do the data in Table 2.11 seem to exemplify your textbook author's statement about the typical distribution of white blood count measurements?

[10] b. Apply the rank sum test to assess whether median white blood count differs between the two service groups.

[10] c. Take the natural logarithms of the white blood count measurements in the two service groups. [Check figure: $\log(8) = 2.079$.] Apply the procedure in Section 8.4 to the log-transformed white blood count measurements. Do you conclude that mean log-transformed white blood count differs between the two service groups?

[10] d. Find the equal sample sizes of patients from the two service groups for which you would have 80% power to conclude that mean log-transformed white blood count differs between the two service groups.

[40] 3. Refer to "Diabetes" and Table 9.13 on page 383. Use $\alpha = 0.05$ for all hypothesis tests.

[10] a. Apply the sign test to assess whether there is a nonzero median difference between weight change in the control period and weight change in the lack of consistency period.

[10] b. Apply the signed rank test to assess whether there is a nonzero median difference between weight change in the control period and weight change in the lack of consistency period.

[10] c. Proceeding as if the difference scores were normally distributed, apply the paired t-test to assess whether there is a nonzero mean difference between weight change in the control period and weight change in the lack of consistency period.

[10] d. Comment on the agreements/disagreements of the results from the three testing procedures. Which of the procedures do you think is most appropriate for this data set?