STA 580 — Spring 2009 — Dr. Charnigo

Written Assignment 5

This assignment is due on Thursday 16 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.

[70] 1. Refer to "Hypertension" and Table 12.29 on page 621. Let μ_1 represent the expected reduction in diastolic blood pressure (DBP) for someone who receives counseling for both weight reduction and meditation, μ_2 the expected reduction in DBP for someone who receives counseling for weight reduction only, μ_3 the expected reduction in DBP for someone who receives counseling for meditation only, and μ_4 the expected reduction in DBP for someone who receives no counseling at all. For the time being we will treat this scenario like a one-way layout.

[10] a. Report Between SS and Within SS.

[10] b. Test $H_0 : \mu_1 = \mu_2 = \mu_3 = \mu_4$ against the complementary alternative.

[10] c. Perform these two follow-up tests without any adjustment of the significance level for multiple pairwise comparisons:
- $H_0 : \mu_1 = \mu_2$ against $H_1 : \mu_1 \neq \mu_2$
- $H_0 : \mu_1 = \mu_3$ against $H_1 : \mu_1 \neq \mu_3$

[10] d. Repeat part c with a Bonferroni adjustment for multiple pairwise comparisons. Do not adjust the significance level for all possible pairwise comparisons, just for the two that are actually being made.

[10] e. Express (in terms of μ_1, μ_2, μ_3, and μ_4) a null hypothesis asserting that the expected benefit of counseling for meditation does not depend on whether one receives counseling for weight reduction.

[10] f. Using a Scheffe adjustment, test the null hypothesis that you proposed in part e above.

[10] g. Use the Kruskal-Wallis method to test $H_0 : \Delta_1 = \Delta_2 = \Delta_3 = \Delta_4$ against the complementary alternative, where Δ_1 through Δ_4 are the medians analogous to μ_1 through μ_4.

[30] 2. Again refer to "Hypertension" and Table 12.29 on page 621. Now we will treat this scenario like a two-way layout.

[10] a. Report SST, SSA, SSB, $SSAB$, and SSE. Take counseling for weight reduction to be factor A and counseling for meditation to be factor B.

[10] b. Perform a two-way analysis of variance to test the following null hypotheses:
- zero interaction effects
- zero main effects for counseling for weight reduction
- zero main effects for counseling for meditation

[10] c. Consider the null hypothesis that you proposed in part e of exercise 1. Does it relate to any of the null hypotheses that you tested in part b above? Briefly explain your answer.