STA 580 — Spring 2011 — Dr. Charnigo

Written Assignment 5

This assignment is due on Thursday 14 April at 5:30 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.

[80] 1. A health department inspector visited 24 restaurants last week: 8 fast food restaurants, 8 casual dining restaurants, and 8 fine dining restaurants. To each restaurant she assigned a compliance score between 0 and 100, with 100 indicating perfect compliance with regulations on food handling, food temperature, staff cleanliness, and vermin control. Here are the data.

Fast Food: *84, 87, 90, 92,* **88, 91, 94, 98**

Casual Dining: *88, 90, 93, 98,* **89, 95, 97, 100**

Fine Dining: *89, 92, 95, 96,* **90, 94, 98, 100**

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

[10] b. Let μ_1, μ_2, and μ_3 denote the mean compliance scores at fast food restaurants, casual dining restaurants, and fine dining restaurants respectively. Test $H_0 : \mu_1 = \mu_2 = \mu_3$ 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. Consider $H_0 : \mu_1 - 0.5\mu_2 - 0.5\mu_3 = 0$. In English words, what does this null hypothesis say?

[10] f. Using a Scheffe adjustment, test the null hypothesis in part e against its complementary alternative.

[20] g. Use the Kruskal-Wallis method to test $H_0 : \Delta_1 = \Delta_2 = \Delta_3$ against the complementary alternative, where Δ_1 through Δ_3 are the medians analogous to μ_1 through μ_3.

[20] 2. Consider the restaurant inspection data once more, but now regard the **bold** compliance scores as originating from restaurants whose managerial staff participated in a special training session sponsored by the health department and the *italic* compliance scores as originating from restaurants whose managerial staff did not participate in the training session.

[10] a. Report SST, SSA, SSB, SSAB, and SSE. (Take restaurant type to be factor A and managerial staff training to be factor B.)

[10] b. Perform a two-way analysis of variance to test null hypotheses of zero interaction effects, zero main effects for restaurant type, and zero main effects for managerial staff training.