Homework 8 (Due on April 11)

April 4, 2013 STA 5172

Problem I (ANOVA)

Researchers compared protein intake among three groups of postmenopausal women: (1) women eating a standard American diet (STD), (2) women eating a lacto-ovo-vegetarian diet (LAC), and (3) women eating a strict vegetarian diet (VEG). The mean ± 1 sd for protein intake (mg) is presented in Table 12.29.

Table 12.29 Protein intake (mg) among three dietary groups of postmenopausal women

Group	Mean	*sd*	*n*
STD	75	9	10
LAC	57	13	10
VEG	47	17	6

1. Perform a statistical procedure to compare the means of the three groups using the critical-value method.
2. What is the p-value from the test performed in Part 1?
3. Compare the means of each specific pair of groups.
4. Suppose that in the general population, 70% of vegetarians are lacto-ovo-vegetarians, whereas 30% are strict vegetarians. Perform a statistical procedure to test whether the contrast $L = 0.7\bar{y}_2 + 0.3\bar{y}_3 - \bar{y}_1$ is significantly different from 0. What does the contrast mean?
5. Using the data in Table 12.29, perform a multiple-comparisons procedure to identify which specific underlying means are different.

Problem II: Logistic Regression

In the "MASS" library in R there is a data set called "menarche" (Milicer, H. and Szczotka, F., 1966, Age at Menarche in Warsaw girls in 1965, Human Biology, 38, 199-203), in which

there are three variables: “Age” (average age of age homogeneous groups of girls), “Total” (number of girls in each group), and “Menarche” (number of girls in the group who have reached menarche). Load the dataset in R(library(”MASS”); data(menarche)), fit a logistic regression and plot the estimated probability for menarche vs. the age of women. Interpret the coefficient of “Age” and find the odds ratio of menarche for age 9 and 15.