

## Homework 6

A psychosociological questionnaire was administered to a random sample of 200 persons on an island in the South Pacific that has become increasingly westernized over the past 30 years. From the questionnaire data, each of the 200 persons was classified into one of three groups - HI-POS, NO-DIF, and HI-NEG - according to the discrepancy between the amount of prestige in that person's traditional culture and the amount of prestige in the modern (westernized) culture. On the basis of the questionnaire data, a measure of "anomie" (i.e., social disorientation), denoted by  $Y$ , was determined on a 100-point scale, with the results summarized in the following table.

**Source:** Kelinbaum, Kupper, Muller, and Nizam (1998). *Applied Regression Analysis and Other Multivariate Methods*. 3rd Edition. Duxbury: Pacific Grove, CA.

Table 1: Exercise 17.6

	Group	$n_i$	$\bar{y}_i$	$s_i$
1	HI-POS	50	65	9
2	NO-DIF	75	50	11
3	HI-NEG	75	55	10

- Determine the following ANOVA table based on the information given above. Hint: To determine  $SSR = \sum_{i=1}^3 n_i (\bar{y}_i - \bar{y}_{..})^2$ , first compute the overall sample mean  $\bar{y}_{..} = \frac{n_1\bar{y}_1 + n_2\bar{y}_2 + n_3\bar{y}_3}{n_1 + n_2 + n_3}$ .

Table 2: ANOVA Table

Source	Df	SS	MS	F Value
Model	(1)	(4)	(7)	(9)
Error	(2)	(5)	(8)	
Total	(3)	(6)		

- Test by means of one-way ANOVA whether the three different categories of prestige discrepancy have significantly different sample mean anomie score.
- Use both Tukey's and Scheffe's methods to locate any significant differences between pairs of means. (Use  $\alpha = 0.05$ .)
- Construct Bonferroni's simultaneous 95% intervals for  $\mu_1 - \mu_3$  and  $\left\{ \mu_1 - \frac{\mu_2 + \mu_3}{2} \right\}$ .

**Answer Keys:**

1. It can be found that  $\bar{y}_{..} = 55.63$ . Also,  $SSE = (n_1 - 1) \cdot s_1^2 + (n_2 - 1) \cdot s_2^2 + (n_3 - 1) \cdot s_3^2$ .

Table 3: ANOVA Table

Source	Df	SS	MS	F Value	P-Value
Model	2	6797	3398	32.94	< .00
Error	197	20323	103.2		
Total	199	27120			

2. Tukey's Intervals:

$$\begin{aligned}\mu_1 - \mu_2 &: (8.81, 21.19) \\ \mu_1 - \mu_3 &: (3.81, 16.19) \\ \mu_2 - \mu_3 &: (-10.54, 0.54)\end{aligned}$$

Tukey's Intervals:

$$\begin{aligned}\mu_1 - \mu_2 &: (9.36, 20.64) \\ \mu_1 - \mu_3 &: (4.36, 15.64) \\ \mu_2 - \mu_3 &: (-10.05, 0.045)\end{aligned}$$

3. First compute  $\alpha' = 0.05/2 = 0.025$  and hence the critical value should be  $t_{(197)}^{0.9875} = 2.259$ .  
Bonferroni's Intervals:

$$\begin{aligned}\mu_1 - \mu_3 &: (5.81, 14.19) \\ \left\{ \mu_1 - \frac{\mu_2 + \mu_3}{2} \right\} &: (8.754, 16.25)\end{aligned}$$