

**STAT 8250 — Applied Multivariate Analysis**  
**Homework 4 – Due Monday, October 30**

**Homework Guidelines:**

- Homework is due by 4:30 on the due date specified above. You may turn it in at the beginning of class or place it in my mailbox in the Statistics Building. **No late homeworks will be accepted!**
- Use only standard (8.5 × 11 inch) paper and use only one side of each sheet.
- Homework should show enough detail so that the reader can clearly understand the procedures of the solutions.
- Problems should appear in the order that they were assigned.
- If you use a computer to obtain your results, append both the computer program and the associated output to your homework. Label all appended sheets clearly and in your answer refer specifically to appended results when relevant. For example, “The correlation matrix is

$$\begin{pmatrix} 1.00 & 0.53 \\ 0.53 & 1.00 \end{pmatrix}$$

(see p.3 of attached output labelled ‘hwk1\_3a.lst’).”

**Assignment:**

From the text do the following problems:

6.5, 6.17, 6.22, 6.26.

In addition do the following problem:

Consider the data in the following table (these data can also be found in file hwk4data.dat on the course website):

Patient	Time after Treatment				
	5	10	15	20	25
1	11	18	15	18	15
2	33	27	31	21	17
3	20	28	27	23	29
4	28	26	18	18	18
5	22	23	22	16	10
6	20	22	16	15	12
7	24	27	22	21	24
8	30	26	30	24	20

- a. Test the hypothesis that the mean response is the same at all time periods using Hotelling’s  $T^2$  test. Use  $\alpha = .05$  and state your conclusions.

- b. Let  $\Sigma = \text{var}(\mathbf{x}_i)$   $i = 1, \dots, 8$ , where  $\mathbf{x}_i = (x_{i1}, x_{i2}, x_{i3}, x_{i4}, x_{i5})'$  and  $x_{ij}$  is the response for the  $i^{\text{th}}$  patient at occasion  $j$  (5, 10, 15, 20, or 25 minutes after treatment). Test the hypothesis that  $\Sigma$  satisfies the Hyuhn-Feldt conditions as illustrated in lab #4. Use  $\alpha = .10$  and state your conclusions.
- c. If the Hyuhn-Feldt conditions on  $\Sigma$  are satisfied then the data can be analyzed (e.g., it can be tested that there is no time effect) using a univariate randomized complete block (RCB) analysis. Let's assume that the H-F conditions are satisfied. Based on the univariate (RCB) analysis, report a test statistic and  $p$ -value for the hypothesis that the mean response is the same at times 5, 10, 15, 20 and 25 minutes after treatment. How does the  $p$ -value compare to that obtained in part (a)?