

BIBD Discussion

Respond to the following questions individually then discuss your answers in your group. You should hand in both your individual responses and a group response. We will discuss your group responses and then I will lecture on advanced topics.

1. Does a balanced design exist for a=5 treatments, k=4 treatments per block and r=3 replications of the treatment? (Check for integer λ)
2. Which SAS statement would provide the appropriate Type I SS for testing a treatment effect? Why?
 - (a) MODEL Y=BLOCK TRT
 - (b) MODEL Y=TRT BLOCK
3. We will use the example below to understand the equations that follow; understanding the equations will help you in deriving LS estimators for treatment effects. Start by writing down a 4 by 4 table—4 treatments by 4 blocks—for the example and recording n_{ij} for each entry in the table. Remember that

$$n_{ij} = \begin{cases} 1 & \text{if treatment } i \text{ is in block } j \\ 0 & \text{if treatment } i \text{ is not in block } j \end{cases}$$

Block 1	Block 2	Block 3	Block 4
A	A	A	B
B	B	C	C
C	D	D	D

Using your work in the above example to provide insights, explain why the first four equations below are true and identify which rules were used in each step of the fifth equation.

$$n_{ij}^2 = n_{ij}$$

$$\sum_j n_{ij} = r$$

$$\sum_i n_{ij} = k$$

$$\sum_j n_{ij} n_{hj} = \lambda \quad (h \neq i)$$

$$\sum_j \sum_h n_{ij} n_{hj} \hat{\tau}_h = \sum_{h \neq i} \sum_j n_{ij} n_{hj} \hat{\tau}_h + \sum_j n_{ij}^2 \hat{\tau}_i = \lambda \sum_{h \neq i} \hat{\tau}_h + r \hat{\tau}_i = (r - \lambda) \hat{\tau}_i$$