

CSUEB – STAT 6305 – Winter 2017 - Prof Yan Zhou

Homework 6 - Henry Lankin

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Extra Credit: Test Redo1. A Latin square design is run with $t = 4$ treatments. (Optional, 10pt)

- a) How many total degrees of freedom would be available in this Latin Square design? 15

$$\text{total degrees of freedom} = n^2 - 1 = 4^2 - 1 = 15$$

- b) How many degrees of freedom are available for error? 6

$$\text{error degrees of freedom} = (n - 1)(n - 2) = (3)(2) = 6$$

- c) Discuss whether one would be able to test for interactions between any two variables?

By the Latin Square design, there is no interaction of interest between a block and a factor. Further, there is no interaction of interest between the two blocks. Therefore, we would not test for interactions between any of the variables.

- d) A standard square lists the factor levels A, B, C, and D in order in the first row and first column. Otherwise, each factor level must appear exactly once in the remaining rows and columns. Provide another standard 4 by 4 square other than the one shown below

A B C D	B D A C
B C D A	D A C B
C D A B	A C B D
D A B C	C B D A

- e) What is the degrees of freedom for the overall F-test(all treatments are the same)? $df_1 = 3, df_2 = 6$

- f) Write a set of mutually orthogonal contrast statements to compare the 4 treatment means.

Contrast	μ_1	μ_2	μ_3	μ_4
l_1	-1	-1	1	1
l_2	1	-1	0	0
...	0	0	-1	1

- g) What does the sum of squares of the set of contrast statement in f) add up to?

The sum of squares of the contrast statements adds up to the sum of squares of the treatment.

- h) What is the degree of freedom for each contrast statement? _____1_____

- i) On the right side of box, write down the first 6 lines(including the variable names) of what an analysis-ready dataset will look like under SAS in order to analyze the following Latin square.

Driver	Car Model				
	1	2	3	4	
1	A(15.5)	B(33.8)	C(13.7)	D(29.2)	1 1 A 15.5
2	B(16.3)	C(26.4)	D(19.1)	A(22.5)	2 1 B 16.3
3	C(10.5)	D(31.5)	A(17.5)	B(30.1)	3 1 C 10.5
4	D(14.0)	A(34.5)	B(19.7)	C(21.6)	4 1 D 14.0
					1 2 B 33.8
					2 2 C 26.4