THE COMPLETE RANDOMIZED BLOCK DESIGN (PART II)

Driver	A	B	C	
1	470	510	520	$B_1 = 1500$
2	530	540	550	$B_2 = 1620$
3	560	570	580	$B_3 = 1710$
4	590	610	620	$B_4 = 1820$
	T_1	T_2	T_3	
	2150	2230	2270	

$$\sum_{i=1}^{12} Y_i = 6650$$

$$\sum_{i=1}^{12} Y_i^2 = 3{,}705{,}900$$

$$\text{Correction for the mean} = CM = \frac{(\sum Y)^2}{n} = \frac{6650^2}{12} = 3{,}685{,}208$$

$$SS_{Tot} = \sum Y^2 - CM = 3{,}705{,}900 - 3{,}685{,}208 = 20{,}691.67$$

$$SST = \frac{T_1^2}{b} + \frac{T_2^2}{b} + \frac{T_3^2}{b} - CM = \frac{2150^2}{4} + \frac{2230^2}{4} + \frac{2270^2}{4} -$$

$$- 3{,}685{,}208 = 1866.67$$

$$SSB = \frac{B_1^2}{K} + \frac{B_2^2}{K} + \frac{B_3^2}{K} + \frac{B_4^2}{K} - CM =$$

$$= \frac{1500^2}{3} + \frac{1620^2}{3} + \frac{1710^2}{3} + \frac{1820^2}{3} - 3{,}685{,}208 = 18{,}425$$

$$SSE = SS_{tot} - SST - SSB =$$

$$= 20{,}691.67 - 1{,}866.67 - 18{,}425 = 400$$

$$MST = \frac{SST}{K-1} = \frac{1866.67}{3-1} = 933.34$$

$$MSE = \frac{SSE}{n-1-(k-1)-(b-1)} = \frac{400}{6} = 66.7$$

$$F = \frac{MST}{MSE} = \frac{933.34}{66.7} = 14$$

Was the blocking effective?

step1 $H_0: \mu_{B_1} = \mu_{B_2} = \mu_{B_3} = \mu_{B_4}$

H_a: At least two block means differ

step2 Test stat

$$F_B = \frac{MSB}{MSE}$$

$$MSB = \frac{SSB}{b-1} = \frac{18{,}425}{4-1} = 6141.67$$

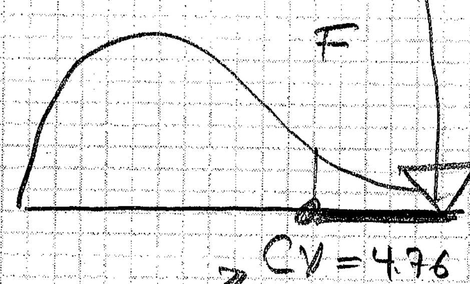
$$F_B = \frac{6141.67}{66.7} = 92.125$$

step3 Rejection Region

$\alpha = .05$

$df_{num} = \nu_1 = 3$

$df_{denom} = \nu_2 = 6$



RR: $F > 4.76$

step4 Decision: Reject H_0

Step5 Conclusion:

"The data provide sufficient evidence to conclude, at $\alpha = .05$, that at least two drivers differ in the mean number of miles per gallon"

i,e: Blocking was effective.

ANOVA SUMMARY TABLE

Sources of Variation	df	SS	MS	F
Treatments	2	1,866.67	933.34	14
Blocks	3	18,425	6141.67	92.125
Error	6	400	66.7	
Total	11	20,691.67		