10.92 P566

		B: 1	B: 2	B: 3	Total
A	1	3.1, 4.0 $T_1 = 7.1$	4.6, 4.2 $T_2 = 8.8$	6.4, 7.1 $T_3 = 13.5$	$A_1 = 29.4$
	2	5.9, 5.3 $T_4 = 11.2$	2.9, 2.2 $T_5 = 5.1$	3.3, 2.5 $T_6 = 5.8$	$A_2 = 22.1$
Total		$B_1 = 18.3$	$B_2 = 13.9$	$B_3 = 19.3$	$T = 51.5$

$a = 2 \quad b = 3 \quad r = 2 \quad n = abr = 2 * 3 * 2 = 12$

$a * b = 2 * 3 = 6$ treatment combinations i.e. 6 treats

$T_1, T_2, T_3, T_4, T_5, T_6$ are totals for these treats shown in the table.

$$CM = \frac{T^2}{n} = \frac{(51.5)^2}{12} = 221.0208$$

$$SS\,Total = \left(\sum X^2\right) - CM$$

for all data

$$= \left[(3.1)^2 + (4.0)^2 + (5.9)^2 + \dots (2.5)^2\right] - CM$$

$$= 249.07 - 221.0208 = 28.0492$$

$$SST = \frac{T_1^2 + T_2^2 + T_3^2 + T_4^2 + T_5^2 + T_6^2}{r} - CM$$

$$= \left[\frac{(7.1)^2 + (8.8)^2 + (13.5)^2 + (11.2)^2 + (5.1)^2 + (5.8)^2}{2}\right] - CM$$

$$= 247.5750 - 221.0208 = 26.5542$$

$$SSA = \left[\frac{A_1^2 + A_2^2}{br}\right] - CM$$

$$= \left[\frac{(29.4)^2 + (22.1)^2}{6}\right] - CM$$

$$= 225.4617 - 221.0208 = 4.4409$$

$$SSB = \left[\frac{B_1^2 + B_2^2 + B_3^2}{ar}\right] - CM = \left[\frac{(18.3)^2 + (13.9)^2 + (19.3)^2}{4}\right] - CM$$

$$= 225.1475 - 221.0208 = 4.1267$$

$$SSA*B = SST - SSA - SSB = 18.0066$$

$$SSE = SS\,Tot - SST = 28.0492 - 26.5742 = 1.4750$$

ANOVA

Source	df	SS	MS	F
A	1	4.4409	4.4409	18.06
B	2	4.1267	2.0634	8.39
A*B	2	18.0066	9.0033	36.62
Error	6	1.4750	.2458	
Total	11	28.0492	x	x

Tests First test is for interaction

(1) H_0: There is no interaction between A & B factors

H_a: There is interaction between two factors

(2) $\alpha = .05$ (3) Test Stat. $= \frac{MSA*B}{MSE}$, $df_{num} = 2$, $df_{den} = 6$

(4) Rule: Reject H_0 if $F > F_\alpha = 5.16$

(5) $F = 36.62$

(6) Conclusion: $36.62 > 5.16$ Reject H_0

There is sufficient evidence that there is interaction between factors