Set up an analysis of variance table for the following two-way design results: per acre production data for three varieties of wheat. Also state whether variety difference are significant at 5% level (Given that F2,6=5.14 and F=3,6=4.76)

Per acre production data

Plot of land	Variety of wheat		
	A	B	C
1	6	5	5
2	7	5	4
3	3	3	3
4	8	7	4

Solution:

	A	B	C	Total
1	6	5	5	36
2	7	5	4	16
3	3	3	3	9
4	8	7	4	19
Total	24	20	16	60

A^2	B^2	C^2	
36	25	25	
49	25	16	
9	9	9	
64	49	16	
158	108	66	$332=\sum X^2$

I. Sum of all observations

$T=24+20+16=60$

$n=\sum ni=4+4+4=12$

Corrector factor $= (T)^2/n=(60)^2/12=300$

II. Total SS

$\sum X^2 - (T)^2/n=332-300=32$

III. SS between columns

$\sum(Tj)^2/nj-(T)^2/n = (24)^2+(20)^2+(16)^2/4-300=308-300=8$

IV. SS between rows

$\sum(Ti)^2/ni-(T)^2/n = (16)^2+(16)^2+(9)^2+(19)^2/3-300=318-300=18$

V. SS residual = Total SS-(SS between columns + SS between rows)

32-(8+18) = 32-26=6

VI.

Source Of Variance	Sum Of Sqaures	Degree Of Freedom	Mean Sqaure Value(MS)	F-ratio Value
Between Columns	8	c-1= (3-1)=2	SSB(columns)/ c-1=8/2=4	MSC(column)/MSR=4/1= 4<5.14 (F2,6)
Between Rows	18	r-1= (4-1)=3	SSB(rows)/ r-1=18/3=6	MSR(rows)/MSR=6/1= 6>4.76 (F3,6)
Residual or error	6	(c-1)(r-1) =(3)(2)=6	SSresidual/ (c-1)(r-1)= 6/6=1	
Total	32			

From the ANOVA we conclude that the variety of wheat of F(2,6) is insignificant as the calculated ratio 4 is less than 5.14.

Whereas, the variety of wheat of F(3,6) is significant as the calculated ratio 6 is greater than 4.76.