

```
/Users/bps/PycharmProjects/regression_anova/venv/bin/python /Users/bps/PycharmProjects/regression_anova/main.py
```

Welcome to Regression, Correlation, Anova Calculator by AG

```
1. Regression
2. Correlation
3. One Way Anova
4. Two Way Anova
4
```

4. Two Way Anova

Enter the no of Treatments: 4

Enter the no of Blocks: 3

Level of significance: 0.01

Enter the Data

45 43 51

47 46 52

48 50 55

42 37 49

a (No of Treatments) = 4

b (No of Blocks) = 3

a\*b (Total no of Samples) = 12

Ti. = [139. 145. 153. 128.]

T.j = [139. 145. 153. 128.]

$\sum \sum y_{ij}^2 = 26867.0$

$C (T_{..}^2 / a*b) = 26602.08333$

$SS(Tr) = 110.91667$   
 $SS(BL) = 135.16667$   
 $SSE = 18.83333$   
 $SST = 264.91667$

$MS(Tr) (SS(Tr)/(a-1)) = 36.97222$   
 $MS(BL) (SS(BL)/(b-1)) = 67.58334$   
 $MSE (SSE/(a-1)*(b-1)) = 3.13889$

$F_{Tr} (MS(Tr)/MSE) = 11.779$   
 $F_{BL} (MS(BL)/MSE) = 21.531$

Source of variation	Degree of freedom	Sum of square	Mean square	F
Treatments	$a-1 = 3$	$SS(Tr) = 110.91667$	$MS(Tr) = 36.97222$	11.779
Blocks	$b-1 = 2$	$SS(BL) = 135.16667$	$MS(BL) = 67.58334$	21.531
Error	$(a-1)(b-1) = 6$	$SSE = 18.83333$	$MSE = 3.13889$	
-----	-----	-----	-----	-----
Total	$ab-1 = 11$	$SST = 264.91667$		

### Treatments Testing

Testing  $\alpha_1 \neq \alpha_2 \neq \alpha_3 \neq \alpha_4 \neq 0$  the alternative Hypothesis to test with null  $\alpha_1 = \alpha_2 = \alpha_3 = \alpha_4 = 0$   
 The null  $\alpha_1 = \alpha_2 = \alpha_3 = \alpha_4 = 0$  must be rejected if  $F > 9.7795$

### Calculations

$F(\text{Tr}) = 11.779$

Decision

Null  $\alpha_1=\alpha_2=\alpha_3=\alpha_4=0$  must be Rejected at level of significance 0.01 and Accept  $\alpha_1\neq\alpha_2\neq\alpha_3\neq\alpha_4\neq 0$

Blocks Testing

Testing  $\beta_1\neq\beta_2\neq\beta_3\neq 0$  the alternative Hypothesis to test with null  $\beta_1=\beta_2=\beta_3=0$

The null  $\beta_1=\beta_2=\beta_3=0$  must be rejected if  $F>10.9248$

Calculations

$F(\text{Bl}) = 21.531$

Decision

Null  $\beta_1=\beta_2=\beta_3=0$  must be Rejected at level of significance 0.01 and Accept  $\beta_1\neq\beta_2\neq\beta_3\neq 0$

Process finished with exit code 0