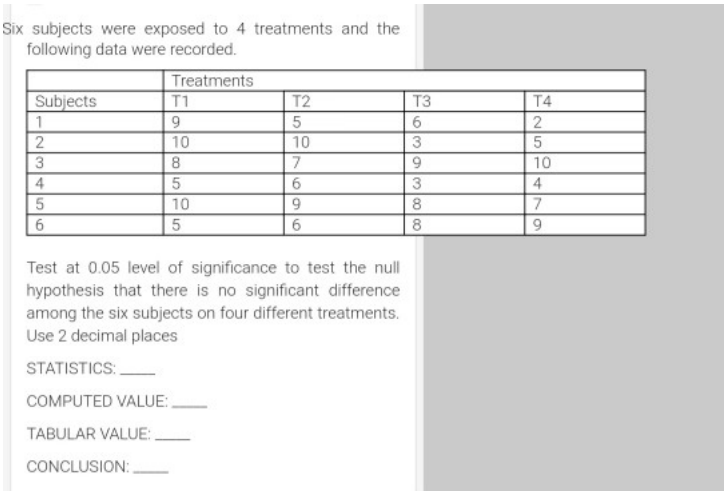
Question: Six subjects were exposed to 4 treatments and the following …



Six subjects were exposed to 4 treatments and the following data were recorded.

	Treatments			
Subjects	T1	T2	T3	T4
1	9	5	6	2
2	10	10	3	5
3	8	7	9	10
4	5	6	3	4
5	10	9	8	7
6	5	6	8	9

Test at 0.05 level of significance to test the null hypothesis that there is no significant difference among the six subjects on four different treatments. Use 2 decimal places

STATISTICS: ____

COMPUTED VALUE: ____

TABULAR VALUE: ____

CONCLUSION: ____

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Expert Answer

Priyanka Mali answered this
820 answers

Was this answer helpful? 1 0

5	10	7	6	9	6
6	3	9	3	8	8
2	5	10	4	7	9
$\sum A = 22$	$\sum B = 28$	$\sum C = 34$	$\sum D = 18$	$\sum E = 34$	$\sum F = 28$

A^2	B^2	C^2	D^2	E^2	F^2
81	100	64	25	100	25
25	100	49	36	81	36
36	9	81	9	64	64
4	25	100	16	49	81
$\sum A^2 = 146$	$\sum B^2 = 234$	$\sum C^2 = 294$	$\sum D^2 = 86$	$\sum E^2 = 294$	$\sum F^2 = 206$

Data table

Group	A	B	C	D	E	F	Total
N	$n_1 = 4$	$n_2 = 4$	$n_3 = 4$	$n_4 = 4$	$n_5 = 4$	$n_6 = 4$	$n = 24$
$\sum x_i$	$T_1 = \sum x_1 = 22$	$T_2 = \sum x_2 = 28$	$T_3 = \sum x_3 = 34$	$T_4 = \sum x_4 = 18$	$T_5 = \sum x_5 = 34$	$T_6 = \sum x_6 = 28$	$\sum x = 164$
$\sum x_i^2$	$\sum x_1^2 = 146$	$\sum x_2^2 = 234$	$\sum x_3^2 = 294$	$\sum x_4^2 = 86$	$\sum x_5^2 = 294$	$\sum x_6^2 = 206$	$\sum x^2 = 1260$
Mean $\bar{x}_i$	$\bar{x}_1 = 5.5$	$\bar{x}_2 = 7$	$\bar{x}_3 = 8.5$	$\bar{x}_4 = 4.5$	$\bar{x}_5 = 8.5$	$\bar{x}_6 = 7$	Overall $\bar{x} = 6.8333$
Std Dev S_i	$S_1 = 2.8868$	$S_2 = 3.559$	$S_3 = 1.291$	$S_4 = 1.291$	$S_5 = 1.291$	$S_6 = 1.8257$	

Let k = the number of different samples = 6

$n = n_1 + n_2 + n_3 + n_4 + n_5 + n_6 = 4 + 4 + 4 + 4 + 4 + 4 = 24$

Overall $\bar{x} = \frac{164}{24} = 6.8333$

$\sum x = T_1 + T_2 + T_3 + T_4 + T_5 + T_6 = 22 + 28 + 34 + 18 + 34 + 28 = 164 \rightarrow (1)$

$\frac{(\sum x)^2}{n} = \frac{164^2}{24} = 1120.6667 \rightarrow (2)$

$\sum \frac{T_i^2}{n_i} = \left(\frac{22^2}{4} + \frac{28^2}{4} + \frac{34^2}{4} + \frac{18^2}{4} + \frac{34^2}{4} + \frac{28^2}{4}\right) = 1172 \rightarrow (3)$

$\sum x^2 = \sum x_1^2 + \sum x_2^2 + \sum x_3^2 + \sum x_4^2 + \sum x_5^2 + \sum x_6^2 = 146 + 234 + 294 + 86 + 294 + 206 = 1260 \rightarrow (4)$

ANOVA:

Step-1 : sum of squares between samples

$SSB = \left(\sum \frac{T_i^2}{n_i}\right) - \frac{(\sum x)^2}{n} = (3) - (2)$

$= 1172 - 1120.6667$

$= 51.3333$

Or

$SSB = \sum n_j \cdot (\bar{x}_j - \bar{x})^2$

$= 4 \times (5.5 - 6.8333)^2 + 4 \times (7 - 6.8333)^2 + 4 \times (8.5 - 6.8333)^2 + 4 \times (4.5 - 6.8333)^2 + 4 \times (8.5 - 6.8333)^2 + 4 \times (7 - 6.8333)^2$

$= 51.3333$

Step-2 : sum of squares within samples

$SSW = \sum x^2 - \left(\sum \frac{T_i^2}{n_i}\right) = (4) - (3)$

$= 1260 - 1172$

$= 88$

Step-3 : Total sum of squares

$SST = SSB + SSW$

$= 51.3333 + 88$

$= 139.3333$

Step-4 : variance between samples

$MSB = \frac{SSB}{k - 1}$

$= \frac{51.3333}{5}$

$= 10.2667$

$= \frac{88}{24 - 6}$

$= \frac{88}{18}$

$= 4.8889$

Step-6 : test statistic F for one way ANOVA test

$F = \frac{\text{MSB}}{\text{MSW}}$

$= \frac{10.2667}{4.8889}$

$= 2.1$

the degree of freedom between samples
$k - 1 = 5$

Now, degree of freedom within samples
$n - k = 24 - 6 = 18$

ANOVA table

Source of Variation	Sums of Squares SS	Degrees of freedom DF	Mean Squares MS	F	p-value
Between samples	SSB = 51.3333	$k - 1 = 5$	MSB = 10.2667	2.1	0.1125
Within samples	SSW = 88	$n - k = 18$	MSW = 4.8889		
Total	SST = 139.3333	$n - 1 = 23$			

H_0 : There is no significant differentiating between samples

H_1 : There is significant differentiating between samples

$F(5, 18)$ at 0.05 level of significance

$= 2.7729$

As calculated $F = 2.1 < 2.7729$

So, H_0 is accepted, Hence there is no significant differentiating between samples

Dear Students,
I am waiting for feedback. I have given my 100% to solve your problem. If you satisfied with my answer then please please hit like.
Thank You.

Comment >

Practice with similar questions

Q: Six subjects were exposed to 4 treatments and the following data were recorded. Subjects T3 T4 12 16 3 2 Treatments IT1 T2 19 1 5 10 10 8 17 5 6 10 9 56 5 10 ထထထol 5 7 6 19 Test at 0.05 level of significance to test the null hypothesis that there is no significant difference among the six subjects on four different treatments.Use 2 decimal places in the final answer

A: See answer 100% (1 rating)

Up next for you in Statistics and Probability

Refer to Exhibit 13-6. If at a
5% significance level we want

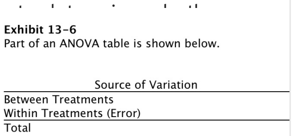
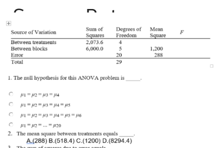


Exhibit 13–6
Part of an ANOVA table is shown below.

Source of Variation
Between Treatments
Within Treatments (Error)
Total

See answer

Sum of Degrees of Mean SquaresFreedom 2,073.6 6,000.0 Source of Variation



See answer

See more questions for subjects you study

Q: Six subjects were exposed to 4 treatments and the following data were recorded. Subjects T3 T4 12 16 3 2 Treatments IT1 T2 19 1 5 10 10 8 17 5 6 10 9 56 5 10 ∞∞∞ol 5 7 6 19 Test at 0.05 level of significance to test the null hypothesis that there is no significant difference among the six subjects on four different treatments.Use 2 decimal places in the final answer

A: See answer 100% (1 rating)

Q: QUESTION 30 There is some research indicating that college students who use Facebook while studying tend to have lower grades than non- users (Kirschner & Karpinski, 2010). A researcher asks a representative sample of college students to report their Facebook use and GPA. She classifies students into three groups: Non-user of Facebook (Group 1), Rarely Uses Facebook (Group 2), and...

A: See answer

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