IDM404 Spring 2021 Fill-in-the-ANOVA-table Lecture January 15, 2021

This Fill-in-the-ANOVA-table Lecture uses a two-way ANOVA as an example. The same principles and mathematical relationships apply to a one-way ANOVA. Note that you cannot calculate the p-value by manipulating the other values in the table. You could determine the p-value using computer software, but that is not the purpose of this exercise.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
| *Source of Variation* | *SS* | *df* | *MS* | *F* | *P-value* |
| City | 144.50 | dfCity | 144.50 | 5.37 | 0.04 |
| Company | 822.11 | dfCompany | 411.06 | FCompany | 0.00 |
| Interaction | SSInteraction | 2 | 21.50 | FInteraction | 0.47 |
| Within | 322.67 | 12 | 26.89 |  |  |
|  |  |  |  |  |  |
| Total | 1332.28 | dfTotal |   |   |   |
|  |  |  |  |  |  |

Consider the Two-Way ANOVA Table that includes six missing values.

How can you determine the value of SSInteraction ?

Method 1: 2 \* 21.50 = SSInteraction

Method 2: 1332.28 - 322.67 - 822.11 - 144.50 = SSInteraction

How can you determine the value of dfCity and dfCompany?

df factor 1 (City) 144.50 / 144.50 = 1

df factor 2 = (Company) = 822.11 / 411.06 = 2

Note that df is an integer. If the mathematical value computes as 1.9999999, enter a value of 2 for df.

How can you determine the value of dfTotal?

Method 1: If you know the total number of items in the data set, you can determine dfTotal using the following relationship. Total number of items in the data set minus 1 = dfTotal.

Method 2: If you know the number of levels of each factor, you can determine the df for each factor. Suppose you were told there were two cities and three companies included in the design. You can determine that dfCity = 1 and dfCompany = 2.

Method 3:. Calculate df factor 1 (City) 144.50 / 144.50 = 1. Calculate df factor 2 = (Company) = 822.11 / 411.06 = 2 Since you were given dfInteraction and df Within, you can add the four values to determine dfTotal.

Once again, note that df is an integer. If the mathematical value computes as 231.99988, enter a value of 232 for df.

How can you calculate the value of FInteraction and FCompany?

Method 1: Use values directly given in the table.

FInteraction = MSInteraction / MSWithin = 21.50 / 26.89

FCompany = MSCompany / MSWithin = 411.06 / 26.89

Method 2: Calculate unknown values using other values given in the table.

EXAMPLE --- Suppose you were not given the value of MSWithin.

1. Calculate MSWithin using the relationship SSWithin/dfWithin = MSWithin
2. Calculate MSWithin using the relationship FCity = MSCity/MSWithin

Additional questions about the design

How many companies were included in the data set?

Number of companies = dfCompany + 1

Was this a 3X2 design?

df factor 1 = 1 Number of levels of factor 1 = 2

df factor 2 = 2 Number of levels of factor 2 = 3

The design is 2 x 3.

Draw the design.

|  |  |  |
| --- | --- | --- |
|  |  |  |
|  |  |  |

2 rows 3 columns

2 levels factor 1 3 levels factor 2