How can I calculate the Intraclass Correlation Coefficient in Excel?

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The Intraclass Correlation Coefficient (ICC) is a statistical measure used to assess the reliability and consistency of data within a group or sample. It is commonly used in research and data analysis to determine the degree of agreement among multiple raters or measurements. To calculate the ICC in Excel, one can use the built-in function "ICC" or manually input the formula, which involves calculating the variance components and dividing them by the total variance. This allows for the quantification of the proportion of total variability that can be attributed to within-group variability. With its user-friendly interface and robust statistical capabilities, Excel is a convenient tool for calculating the ICC and assessing the reliability of data.

Calculate Intraclass Correlation Coefficient in Excel

An (ICC) is used to determine if items (or subjects) can be rated reliably by different raters.

The value of an ICC can range from 0 to 1, with 0 indicating no among raters and 1 indicating perfect reliability.

This tutorial provides a step-by-step example of how to calculate ICC in Excel.

Step 1: Create the Data

Suppose four different judges were asked to rate the quality of 10 different college entrance exams. The results are shown below:

	A	B	C	D	E	F	G
1	Exam	**Judge A**	**Judge B**	**Judge C**	**Judge D**		
2	1	1	2	0	1		
3	2	1	3	4	2		
4	3	3	8	1	3		
5	4	6	4	5	3		
6	5	6	5	5	6		
7	6	7	5	6	4		
8	7	8	7	6	6		
9	8	9	9	9	8		
10	9	8	8	8	8		
11	10	7	8	8	9		
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							
23							
24							

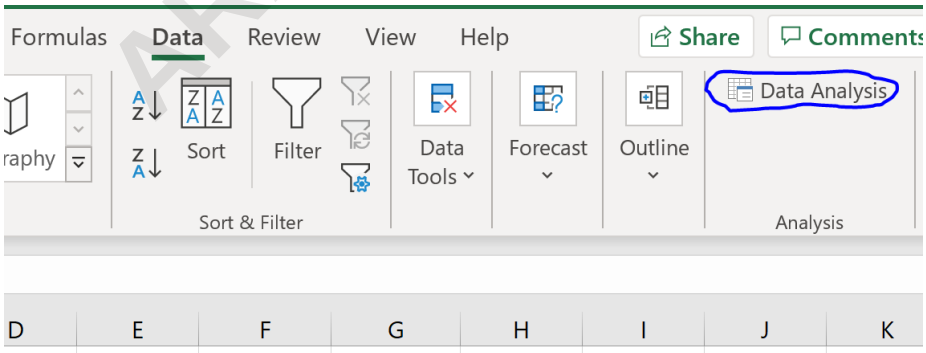
Step 2: Fit an ANOVA

In order to calculate the ICC for these ratings, we first need to fit an Anova: Two-Factor Without Replication.

To do so, highlight cells A1:E11 as follows:

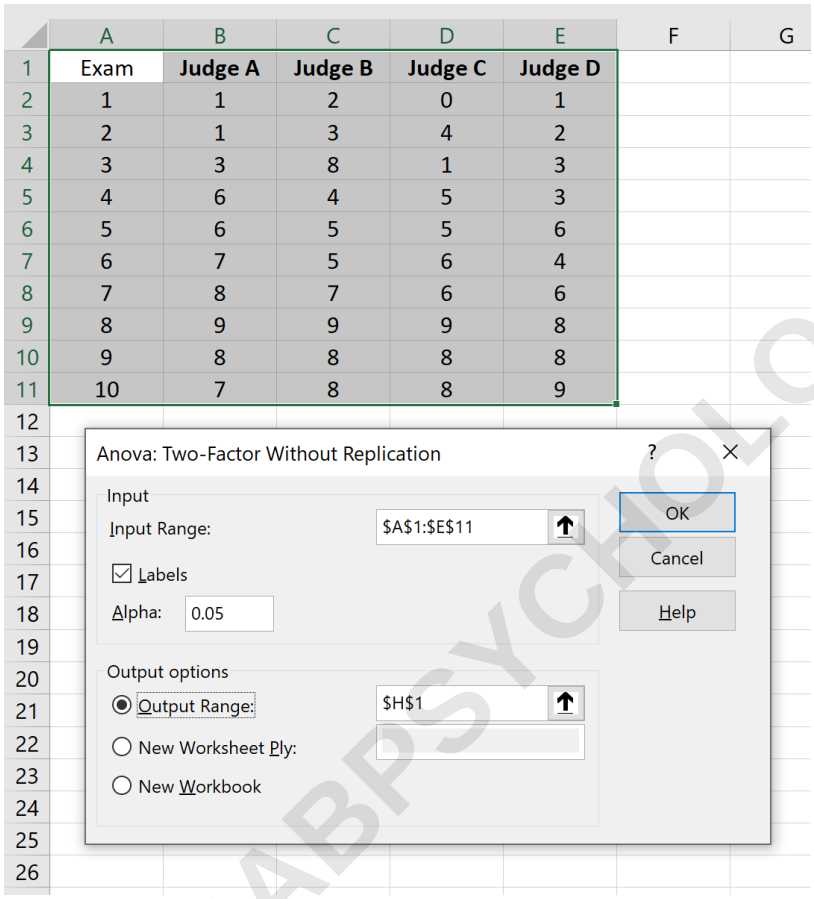
	A	B	C	D	E	F	G
1	Exam	Judge A	Judge B	Judge C	Judge D		
2	1	1	2	0	1		
3	2	1	3	4	2		
4	3	3	8	1	3		
5	4	6	4	5	3		
6	5	6	5	5	6		
7	6	7	5	6	4		
8	7	8	7	6	6		
9	8	9	9	9	8		
10	9	8	8	8	8		
11	10	7	8	8	9		
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							
23							
24							
25							

To do so, click the Data tab along the top ribbon and then click the Data Analysis option under the Analysis group:



If you don't see this option available, you need to first .

In the dropdown menu that appears, click Anova: Two-Factor Without Replication and then click OK. In the new window that appears, fill in the following information and then click OK:



	A	B	C	D	E
1	Exam	Judge A	Judge B	Judge C	Judge D
2	1	1	2	0	1
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4	3	3	8	1	3
5	4	6	4	5	3
6	5	6	5	5	6
7	6	7	5	6	4
8	7	8	7	6	6
9	8	9	9	9	8
10	9	8	8	8	8
11	10	7	8	8	9

The following results will appear:

Anova: Two-Factor Without Replication

SUMMARY	Count	Sum	Average	Variance
1	4	4	1	0.666667
2	4	10	2.5	1.666667
3	4	15	3.75	8.916667
4	4	18	4.5	1.666667
5	4	22	5.5	0.333333
6	4	22	5.5	1.666667
7	4	27	6.75	0.916667
8	4	35	8.75	0.25
9	4	32	8	0
10	4	32	8	0.666667
Judge A	10	56	5.6	8.488889
Judge B	10	59	5.9	5.877778
Judge C	10	52	5.2	8.622222
Judge D	10	50	5	7.777778

ANOVA

Source of Variation	SS	df	MS	F	P-value	F crit
Rows	231.525	9	25.725	15.30744	1.85E-08	2.250131
Columns	4.875	3	1.625	0.966942	0.422653	2.960351
Error	45.375	27	1.680556			
Total	281.775	39				

Step 3: Calculate the Intraclass Correlation Coefficient

We can use the following formula to calculate the ICC among the raters:

Anova: Two-Factor Without Replication

SUMMARY	Count	Sum	Average	Variance
1	4	4	1	0.666667
2	4	10	2.5	1.666667
3	4	15	3.75	8.916667
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Total	281.775	39				

ICC	0.782	=(K23-K25)/(K23+J24*K25+(J24+1)*(K24-K25)/(J23+1))

The intraclass correlation coefficient (ICC) turns out to be 0.782.

Here is how to interpret the value of an intraclass correlation coefficient, according to :

Less than 0.50: Poor reliability

Between 0.5 and 0.75: Moderate reliability

Between 0.75 and 0.9: Good reliability
Greater than 0.9: Excellent reliability

Thus, we would conclude that an ICC of 0.782 indicates that the exams can be rated with "good" reliability by different raters.

A Note on Calculating ICC

There are several different versions of an ICC that can be calculated, depending on the following three factors:

Model: One-Way Random Effects, Two-Way Random Effects, or Two-Way Mixed Effects
Type of Relationship: Consistency or Absolute Agreement
Unit: Single rater or the mean of raters

In the previous example, the ICC that we calculated used the following assumptions:

Model: Two-Way Random Effects
Type of Relationship: Absolute Agreement
Unit: Single rater

For a detailed explanation of these assumptions, please

refer to .