How do I calculate Spearman Rank Correlation in Google Sheets?

Authored by

stats writer

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Spearman Rank Correlation is a statistical measure used to determine the strength and direction of the relationship between two variables. It is often used to analyze non-linear and non-parametric data. In Google Sheets, calculating Spearman Rank Correlation can be done by using the "CORREL" function. This function takes two sets of data as inputs and returns the Spearman Rank Correlation coefficient. The resulting value can range from -1 to 1, with a higher absolute value indicating a stronger correlation between the two variables. By following the correct syntax and inputting the data accurately, users can easily calculate Spearman Rank Correlation in Google Sheets for their data analysis needs.

Calculate Spearman Rank Correlation in Google Sheets

In statistics, correlation refers to the strength and direction of a relationship between two variables. The value of a correlation coefficient can range from -1 to 1, with the following interpretations:

-1: a perfect negative relationship between two variables0: no relationship between two variables1: a perfect positive relationship between two variables

One special type of correlation is called Spearman Rank Correlation, which is used to measure the correlation between two ranked variables. (e.g. rank of a student's math exam score vs. rank of their science exam score in a class).

This tutorial explains how to calculate the Spearman rank correlation between two variables in Google

Sheets.

Example: Spearman Rank Correlation in Google Sheets

Perform the following steps to calculate the Spearman rank correlation between the math exam score and science exam score of 10 students in a particular class.

Step 1: Enter the data.

Enter the exam scores for each student in two separate columns:

	A	B	C	D
1	**Student**	**Math**	**Science**	
2	A	70	90	
3	B	78	94	
4	C	90	79	
5	D	87	86	
6	E	84	84	
7	F	86	83	
8	G	91	88	
9	H	74	92	
10	I	83	76	
11	J	85	75	
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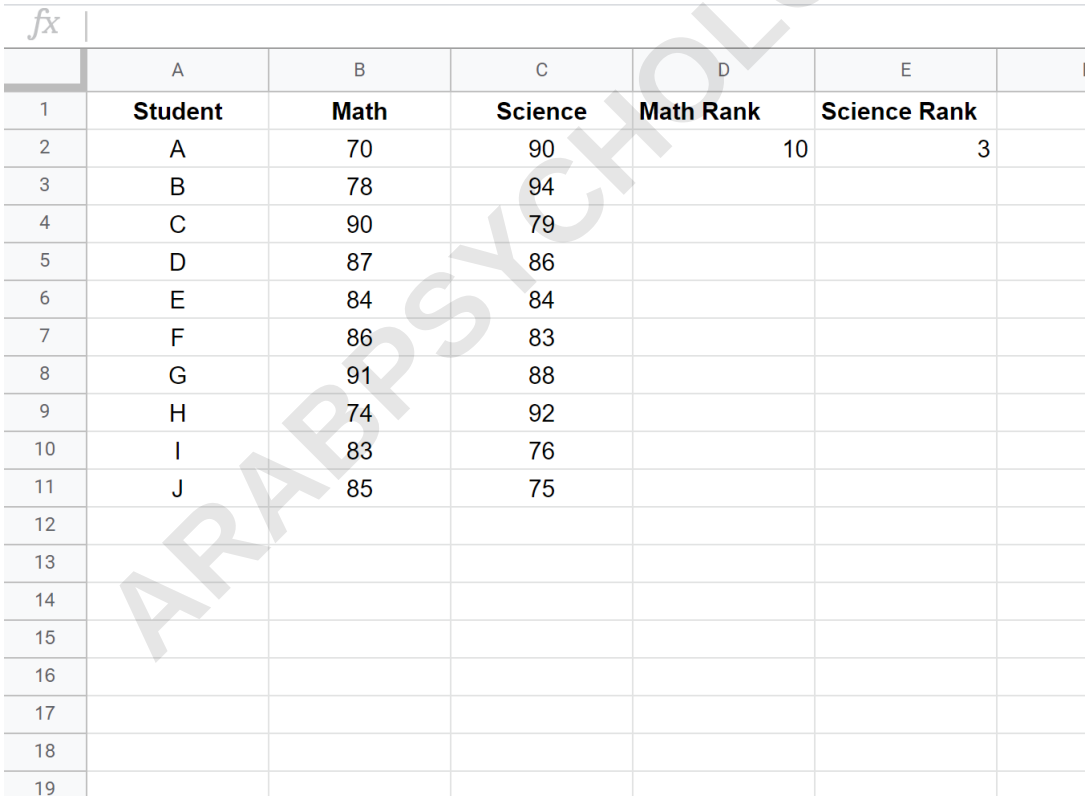
Step 2: Calculate the ranks for each exam score.

Next, we will calculate the rank for each exam score. Use the following formulas in cells D2 and E2 to calculate the Math and Science ranks for the first student:

Cell D2: =RANK.AVG(B2, $B$2:$B$11, 0)

Cell E2: =RANK.AVG(C2, $C$2:$C$11, 0)



	A	B	C	D	E
1	**Student**	**Math**	**Science**	**Math Rank**	**Science Rank**
2	A	70	90	10	3
3	B	78	94		
4	C	90	79		
5	D	87	86		
6	E	84	84		
7	F	86	83		
8	G	91	88		
9	H	74	92		
10	I	83	76		
11	J	85	75		
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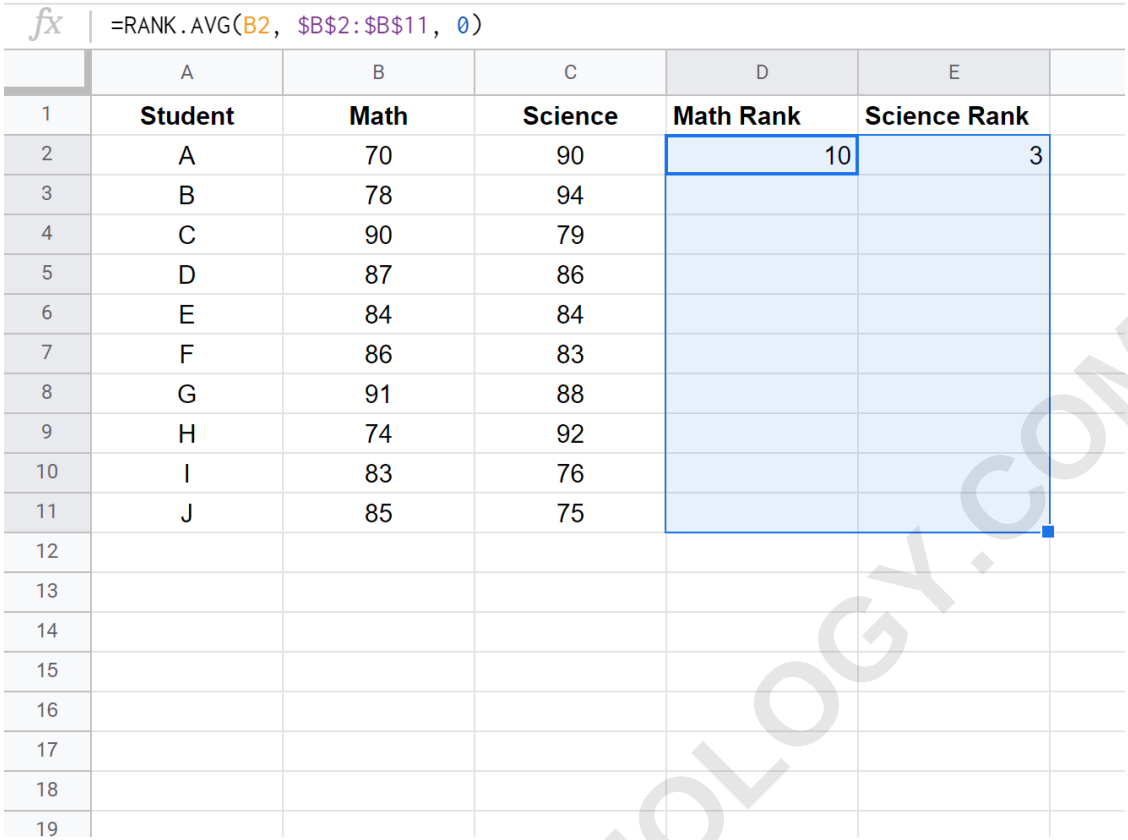
Next, highlight the remaining cells to be filled in:



fx =RANK.AVG(B2, $B$2:$B$11, 0)

	A	B	C	D	E
1	**Student**	**Math**	**Science**	**Math Rank**	**Science Rank**
2	A	70	90	10	3
3	B	78	94		
4	C	90	79		
5	D	87	86		
6	E	84	84		
7	F	86	83		
8	G	91	88		
9	H	74	92		
10	I	83	76		
11	J	85	75		
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Then click Ctrl+D to fill in the ranks for each student:

	A	B	C	D	E
1	**Student**	**Math**	**Science**	**Math Rank**	**Science Rank**
2	A	70	90	10	3
3	B	78	94	8	1
4	C	90	79	2	8
5	D	87	86	3	5
6	E	84	84	6	6
7	F	86	83	4	7
8	G	91	88	1	4
9	H	74	92	9	2
10	I	83	76	7	9
11	J	85	75	5	10
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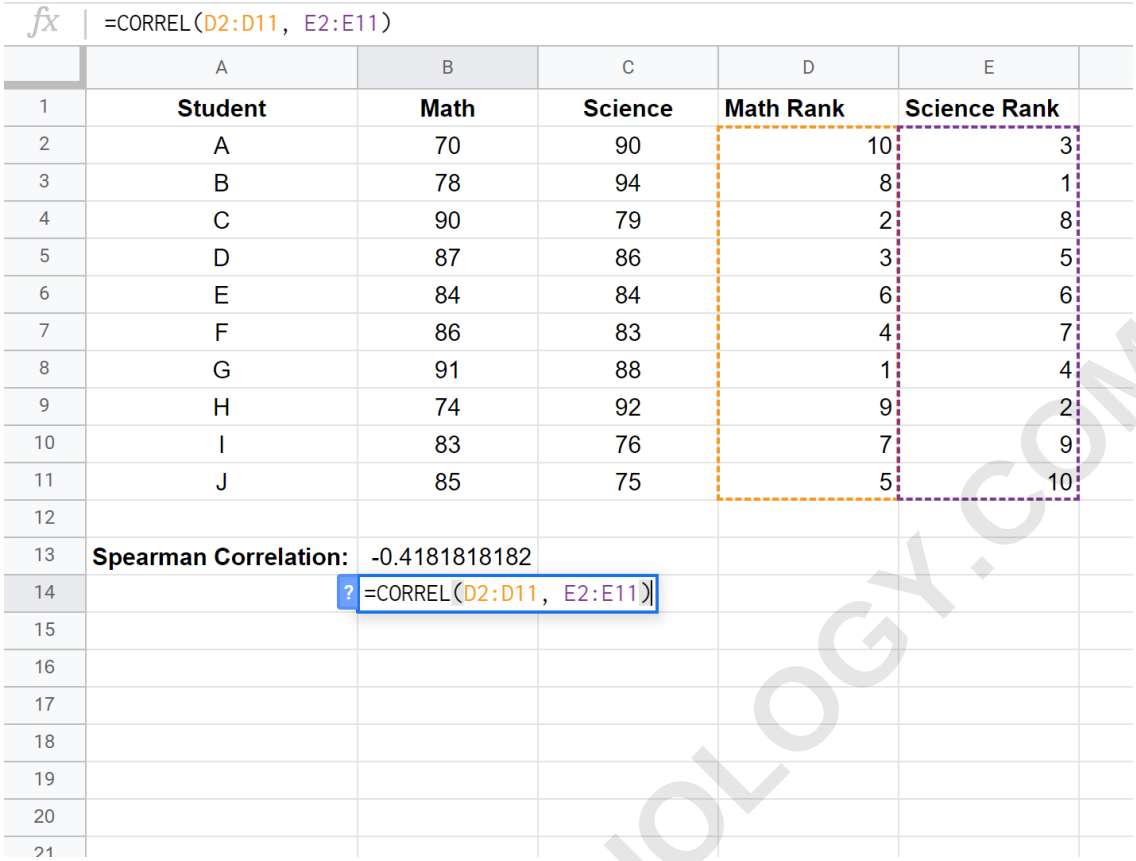
Step 3: Calculate the Spearman Rank Correlation Coefficient.

Lastly, we will calculate the Spearman Rank Correlation Coefficient between Math scores and Science scores by using the CORREL() function:



fx =CORREL(D2:D11, E2:E11)

	A	B	C	D	E
1	**Student**	**Math**	**Science**	**Math Rank**	**Science Rank**
2	A	70	90	10	3
3	B	78	94	8	1
4	C	90	79	2	8
5	D	87	86	3	5
6	E	84	84	6	6
7	F	86	83	4	7
8	G	91	88	1	4
9	H	74	92	9	2
10	I	83	76	7	9
11	J	85	75	5	10
12					
13	**Spearman Correlation:**	-0.4181818182			
14		=CORREL(D2:D11, E2:E11)			
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The Spearman rank correlation turns out to be -0.41818.

Step 4 (Optional): Determine if the Spearman rank correlation is statistically significant.

In the previous step, we found the Spearman rank correlation between the Math and Science exam scores to be -0.41818, which indicates a negative correlation between the two variables.

However, to determine if this correlation is statistically significant, we would need to refer to a Spearman rank

correlation table of critical values, which shows the critical values associated with various sample sizes (n) and significance levels (α).

If the absolute value of our correlation coefficient is greater than the critical value in the table, then the correlation between the two variables is statistically significant.

	α				
n	**0.10**	**0.05**	**0.025**	**0.01**	**0.005**
5	0.800	0.900	1.000	1.000	-
6	0.657	0.829	0.886	0.943	1.000
7	0.571	0.714	0.786	0.893	0.929
8	0.524	0.643	0.738	0.833	0.881
9	0.483	0.600	0.700	0.783	0.833
10	0.455	0.564	0.648	0.745	0.794
11	0.427	0.536	0.618	0.709	0.755
12	0.406	0.503	0.587	0.678	0.727
13	0.385	0.484	0.560	0.648	0.703
14	0.367	0.464	0.538	0.626	0.679
15	0.354	0.446	0.521	0.604	0.654
16	0.341	0.429	0.503	0.582	0.635
17	0.328	0.414	0.488	0.566	0.618
18	0.317	0.401	0.472	0.550	0.600
19	0.309	0.391	0.460	0.535	0.584
20	0.299	0.380	0.447	0.522	0.570
21	0.292	0.370	0.436	0.509	0.556
22	0.284	0.361	0.425	0.497	0.544
23	0.278	0.353	0.416	0.486	0.532
24	0.271	0.344	0.407	0.476	0.521
25	0.265	0.337	0.398	0.466	0.511
26	0.259	0.331	0.390	0.457	0.501
27	0.255	0.324	0.383	0.449	0.492
28	0.250	0.318	0.375	0.441	0.483
29	0.245	0.321	0.368	0.433	0.475
30	0.240	0.306	0.362	0.425	0.467

In our example, our sample size was n = 10 students. Using a significance level of 0.05, we find that the critical value is 0.564.

Because the absolute value of the Spearman rank correlation coefficient that we calculated (0.41818) is not larger than this critical value, it means the correlation between Math and Science scores is not statistically significant.

How to Calculate Spearman Rank Correlation in Excel