2B Spearman's Rank Correlation Coefficient

Spearman's rank correlation coefficient, r_s, is:

To rank two sets of data:

You might use Spearman's rank correlation coefficient instead of the PMCC when:

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1. Two tea tasters were asked to rank nine blends of tea in their order of preference. The tea they liked best was ranked 1. Their orders of preference are shown in the table:

Blend	A	B	C	D	E	F	G	H	I
Taster 1 (x)	3	6	2	8	5	9	7	1	4
Taster 2 (y)	5	6	4	2	7	8	9	1	3

Calculate Spearman's rank correlation coefficient for these data.

x^2									
y^2									
xy									

A Spearman's rank correlation coefficient of:

+1 means

−1 means

0 means

If there are no tied ranks, Spearman's rank correlation coefficient is calculated using:

r_s = where d is and n is

2. During a cattle show, two judges ranked ten cattle for quality according to the following table.

Cattle	A	B	C	D	E	F	G	H	I	J
Judge A	1	5	2	6	4	8	3	7	10	9
Judge B	3	6	2	7	5	8	1	4	9	10
d										
d^2										

Find Spearman's rank correlation coefficient between the two judges and comment on the result.

Tied ranks: equal data values are given a rank equal to:

Data value	200	350	350	400	700	800	800	800	1200
Rank									

With tied ranks, the formula for r_s:

3. The marks of eight pupils in French and German tests were as follows:

	A	**B**	**C**	**D**	**E**	**F**	**G**	**H**
French, f %	52	25	86	33	55	55	54	46
German, g %	40	48	65	57	40	39	63	34
Rank, f								
Rank, g								
d								
d^2								

a) Use the formula below to find an estimate for Spearman's rank correlation coefficient, showing clearly how you deal with tied ranks. Give your answer to 2 decimal places.

$$r_s = 1 - \frac{6\sum d^2}{n(n^2-1)}$$

b) Without recalculating the correlation coefficient, state how your answer to part a would change if:

i) pupil H's mark for German was changed to 38%

ii) a ninth pupil was included who scored 95% in French and 89% in German.

The teacher collects extra data from other students in the class and finds that there are now many tied ranks.

c) Describe how she would now find a measure of the correlation.