Spearman correlation - admission

During the admission procedure, the evaluation was performed by commissions and by a specia
Based on the ranking of the ten students, decide whether both assessments are dependent.

Student	A	B	C	D	E	F	G
commission grade	***4***	***6***	***1***	***5***	***10***	***2***	***7***
program grade	***1***	***3***	***5***	***7***	***8***	***4***	***6***
difference							
difference squared							

H0….correlation between the two grading =0
H1….correlation between the two grading <>0

ıl program.

H	I	J
3	*9*	*8*
2	*10*	*9*

$$r_S = 1 - \frac{6\sum_{i=1}^{n} d_i^2}{n^3 - n}$$

n \ α	0.2	0.1	0.05	0.02	
4	1.000	1.000	—	—	
5	0.800	0.900	1.000	1.000	
6	0.657	0.829	0.886	0.943	1.
7	0.571	0.714	0.786	0.893	0.
8	0.524	0.643	0.738	0.833	0.
9	0.483	0.600	0.700	0.783	0.
10	0.455	0.564	0.648	0.745	0.
11	0.427	0.536	0.618	0.709	0.
12	0.406	0.503	0.587	0.678	0.
13	0.385	0.484	0.560	0.648	0.
14	0.367	0.464	0.538	0.626	0.
15	0.354	0.446	0.521	0.604	0.
16	0.341	0.429	0.503	0.582	0.
17	0.328	0.414	0.488	0.566	0.

n \ α	0.1	0.05	0.02	0.01	n \ α
4	1.000	1.000	—	—	18
5	0.800	0.900	1.000	1.000	19
6	0.657	0.829	0.886	0.943	20
7	0.571	0.714	0.786	0.893	21
8	0.524	0.643	0.738	0.833	22
9	0.483	0.600	0.700	0.783	23
10	0.455	0.564	0.648	0.745	24
11	0.427	0.536	0.618	0.709	25
12	0.406	0.503	0.587	0.678	26
13	0.385	0.484	0.560	0.648	27
14	0.367	0.464	0.538	0.626	28
15	0.354	0.446	0.521	0.604	29
16	0.341	0.429	0.503	0.582	30
17	0.328	0.414	0.488	0.566	

0.01	n \ α	0.2	0.1	0.05	0.02	0.01
—	18	0.317	0.401	0.472	0.550	0.600
—	19	0.309	0.391	0.460	0.535	0.584
.000	20	0.299	0.380	0.447	0.522	0.570
.929	21	0.292	0.370	0.436	0.509	0.556
.881	22	0.284	0.361	0.425	0.497	0.544
.833	23	0.278	0.353	0.416	0.486	0.532
.794	24	0.271	0.344	0.407	0.476	0.521
.755	25	0.265	0.337	0.398	0.466	0.511
.727	26	0.259	0.331	0.390	0.457	0.501
.703	27	0.255	0.324	0.383	0.449	0.492
.679	28	0.250	0.318	0.375	0.441	0.483
.654	29	0.245	0.312	0.368	0.433	0.475
.635	30	0.240	0.306	0.362	0.425	0.467
.618		rho critical values for 2-tailed test				

0.1	0.05	0.02	0.01
0.317	0.401	0.472	0.550
0.309	0.391	0.460	0.535
0.299	0.380	0.447	0.522
0.292	0.370	0.436	0.509
0.284	0.361	0.425	0.497
0.278	0.353	0.416	0.486
0.271	0.344	0.407	0.476
0.265	0.337	0.398	0.466
0.259	0.331	0.390	0.457
0.255	0.324	0.383	0.449
0.250	0.318	0.375	0.441
0.245	0.312	0.368	0.433
0.240	0.306	0.362	0.425

rho critical values for 1-tailed test

Test1	Test2
80	65
50	60
36	35
58	39
72	48
60	44
56	48
68	61

You are given test results (points) from two subjects of 8 randomly selecte
Determine the correlation of a linear dependence of these results by the S

$$r_S = 1 - \frac{6\sum_{i=1}^{n} d_i^2}{n^3 - n}$$

$$r = \frac{\sum (X_i - \overline{X})(Y_i - \overline{Y})}{\sqrt{\sum (X_i - \overline{X})^2 \sum (Y_i - \overline{Y})^2}}$$

d students.

pearman and Pearson coefficients.

n \ α	0.2	0.1	0.05	0.02	0.01	n \ α	0.2	0.1
4	1.000	1.000	—	—	—	18	0.317	0.401
5	0.800	0.900	1.000	1.000	—	19	0.309	0.391
6	0.657	0.829	0.886	0.943	1.000	20	0.299	0.380
7	0.571	0.714	0.786	0.893	0.929	21	0.292	0.370
8	0.524	0.643	0.738	0.833	0.881	22	0.284	0.361
9	0.483	0.600	0.700	0.783	0.833	23	0.278	0.353
10	0.455	0.564	0.648	0.745	0.794	24	0.271	0.344
11	0.427	0.536	0.618	0.709	0.755	25	0.265	0.337
12	0.406	0.503	0.587	0.678	0.727	26	0.259	0.331
13	0.385	0.484	0.560	0.648	0.703	27	0.255	0.324
14	0.367	0.464	0.538	0.626	0.679	28	0.250	0.318
15	0.354	0.446	0.521	0.604	0.654	29	0.245	0.312
16	0.341	0.429	0.503	0.582	0.635	30	0.240	0.306
17	0.328	0.414	0.488	0.566	0.618			

rho critical value

Pearson r crit.	One-Tailed Test		
	.05	.025	.01
	Two-Tailed Test		
df	.10	.05	.02
1	.988	.997	.9995
2	.900	.950	.980
3	.805	.878	.934
4	.729	.811	.882
5	.669	.754	.833
6	.622	.707	.789
7	.582	.666	.750
8	.549	.632	.716
9	.521	.602	.685
10	.497	.576	.658

0.05	0.02	0.01
0.472	0.550	0.600
0.460	0.535	0.584
0.447	0.522	0.570
0.436	0.509	0.556
0.425	0.497	0.544
0.416	0.486	0.532
0.407	0.476	0.521
0.398	0.466	0.511
0.390	0.457	0.501
0.383	0.449	0.492
0.375	0.441	0.483
0.368	0.433	0.475
0.362	0.425	0.467

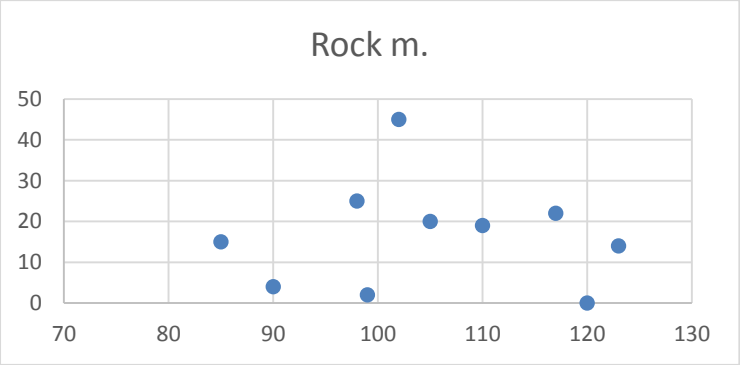
es for 2-tailed test

Data displays the association between the IQ of 10 adolescent in a sample with the number of hours they lister
Determine the strength of the correlation between IQ and rock music using both the Pearson's correlation coef

IQ	Rock m.
99	2
120	0
98	25
102	45
123	14
105	20
85	15
110	19
117	22
90	4

rank IQ rank rock d

$$rs = 1 - \frac{6\sum_{i=1}^{n}}{n^3 -}$$



n\α	0.2	0.1	0.05	0.02	0.0
4	1.000	1.000	–	–	
5	0.800	0.900	1.000	1.000	
6	0.657	0.829	0.886	0.943	1.00
7	0.571	0.714	0.786	0.893	0.92
8	0.524	0.643	0.738	0.833	0.88
9	0.483	0.600	0.700	0.783	0.83
10	0.455	0.564	0.648	0.745	0.79
11	0.427	0.536	0.618	0.709	0.75
12	0.406	0.503	0.587	0.678	0.72
13	0.385	0.484	0.560	0.648	0.70
14	0.367	0.464	0.538	0.626	0.67
15	0.354	0.446	0.521	0.604	0.65
16	0.341	0.429	0.503	0.582	0.63
17	0.328	0.414	0.488	0.566	0.61

ı to rock music per month.
ficient and Spearman's rank correlation. Compare the results.

$$\frac{d_i^2}{n}$$

$$r = \frac{\sum (X_i - \overline{X})(Y_i - \overline{Y})}{\sqrt{\sum (X_i - \overline{X})^2 \sum (Y_i - \overline{Y})^2}}$$

n \ α	0.2	0.1	0.05	0.02	0.01
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	0.312	0.368	0.433	0.475
30	0.240	0.306	0.362	0.425	0.467

rho critical values for 2-tailed test

One-Tailed Test	.05	.025	.01
Two-Tailed Test			
df	.10	.05	.02
1	.988	.997	.9995
2	.900	.950	.980
3	.805	.878	.934
4	.729	.811	.882
5	.669	.754	.833
6	.622	.707	.789
7	.582	.666	.750
8	.549	.632	.716
9	.521	.602	.685
10	.497	.576	.658

Example: Ice Cream Sales

The local ice cream shop keeps track of how much ice cream they sell versus the temperature of that day for t
Formulate a null hypothesis and verify it by Pearsons and Spearman coefficients

Temperature (°C)	Ice Cream Sales ($)
14.2	215
16.4	325
11.9	185
15.2	332
18.5	406
22.1	522
19.4	412
25.1	614
23.4	544
18.1	421
22.6	445
17.2	408

rank t	rank sales	d	
11	11	0	
9	10	-1	
12	12	0	
10	9	1	
6	8	-2	
4	3	1	
5	6	-1	
1	1	0	
2	2	0	
7	5	2	
3	4	-1	
8	7	1	
		14	sum square
		0.951049	.=rs

crit(0,05)= 0.587
The calculated value is
The null hypothesis is r

average			
	18.7	402.4	
differences			dx*dy
	-4.5	-187.4	838.69
	-2.3	-77.4	176.12
	-6.8	-217.4	1473.00
	-3.5	-70.4	244.70
	-0.2	3.6	-0.63
	3.4	119.6	409.57
	0.7	9.6	6.95
	6.4	211.6	1359.42
	4.7	141.6	668.98
	-0.6	18.6	-10.69
	3.9	42.6	167.14
	-1.5	5.6	-8.24
	177.0	174754.9	5325.03

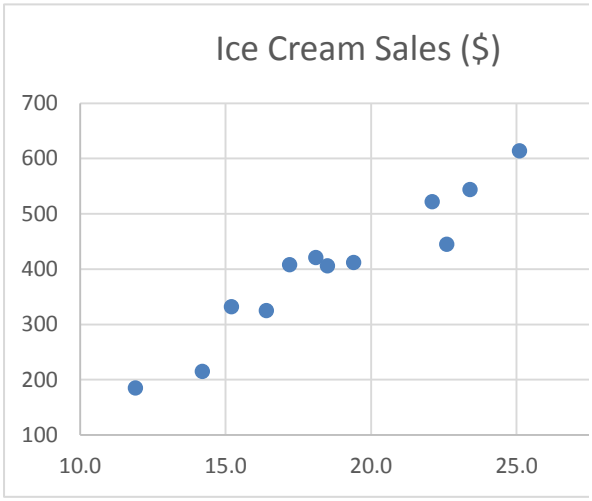
r=	0.957507
d.o.f.=	10
alpha=	0.05
critical=	0.576

The calculated value is above the
Therefore, the null hypothesis is re

the last 12 days:

H0= There is no correlation between the amount of icecream sold and the temperature outside.
H0= There is a correlation.

$$r_S = 1 - \frac{6\sum_{i=1}^{n} d_i^2}{n^3 - n}$$

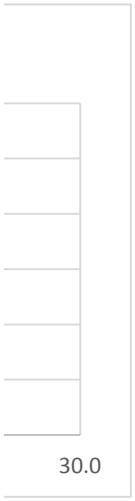


ed

; larger than critical value.
rejected. Therefore, there is a colleration.

$$r = \frac{\sum (X_i - \overline{X})(Y_i - \overline{Y})}{\sqrt{\sum (X_i - \overline{X})^2 \sum (Y_i - \overline{Y})^2}}$$

critical one.
ejected. There is a correlation.



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earson	One-Tailed Test		
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rho critical values for 2-tailed test