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

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

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.

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

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

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
00	20	0.299	0.380	0.447	0.522	0.570
29	21	0.292	0.370	0.436	0.509	0.556
81	22	0.284	0.361	0.425	0.497	0.544
33	23	0.278	0.353	0.416	0.486	0.532
94	24	0.271	0.344	0.407	0.476	0.521
55	25	0.265	0.337	0.398	0.466	0.511
27	26	0.259	0.331	0.390	0.457	0.501
03	27	0.255	0.324	0.383	0.449	0.492
79	28	0.250	0.318	0.375	0.441	0.483
54	29	0.245	0.312	0.368	0.433	0.475
35	30	0.240	0.306	0.362	0.425	0.467
18	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

H0 there is no correlati

Spearman we accept H1 there is a correlatio

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 ice cı	differnce
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

N	12	
N^3	1728	
Pearsons		
averarge	18.7	402.4166667

			dx*dy
	-4.5	-187.4166667	838.6896
	-2.3	-77.41666667	176.1229
	-6.8	-217.4166667	1472.998
	-3.5	-70.41666667	244.6979
	-0.2	3.583333333	-0.62708
	3.4	119.5833333	409.5729
	0.7	9.583333333	6.947917
	6.4	211.5833333	1359.423
	4.7	141.5833333	668.9813
	-0.6	18.58333333	-10.6854
	3.9	42.58333333	167.1396
	-1.5	5.583333333	-8.23542
	-18.7	-402.4166667	7515.131
	525.7	336694.0903	12840.16

r	0.965090023
d.f	0.576

rs	0.951049
Critical valı	0.587

$r =$

he last 12 days:

ion between the number of ice cream sell and the temperature

n between the number of ice cream sell and the temperature

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

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

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

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

0.02	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
1.000	—	19	0.309	0.391	0.460	0.535	0.584
0.943	1.000	20	0.299	0.380	0.447	0.522	0.570
0.893	0.929	21	0.292	0.370	0.436	0.509	0.556
0.833	0.881	22	0.284	0.361	0.425	0.497	0.544
0.783	0.833	23	0.278	0.353	0.416	0.486	0.532
0.745	0.794	24	0.271	0.344	0.407	0.476	0.521
0.709	0.755	25	0.265	0.337	0.398	0.466	0.511
0.678	0.727	26	0.259	0.331	0.390	0.457	0.501
0.648	0.703	27	0.255	0.324	0.383	0.449	0.492
0.626	0.679	28	0.250	0.318	0.375	0.441	0.483
0.604	0.654	29	0.245	0.312	0.368	0.433	0.475
0.582	0.635	30	0.240	0.306	0.362	0.425	0.467
0.566	0.618	rho critical values for 2-tailed test					