Example: Ice Cream Sales

The local ice cream shop keeps track of how much ice cream they sell versus the temperature of that day
Formulate a null hypothesis and verify it by Pearsons and Spearman coefficients
H0: there is no correlation between the number of sales and temperature
H1: there is positive correlation between the number of sales and temperature

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 temperature	rank sales
11	11
9	10
12	12
10	9
6	8
4	3
5	6
1	1
2	2
7	5
3	4
8	7

sumsq=
n
n^3-n
rs=
crit value ((

average	average
18.7	402.42

rs>crit value
H0 rejected

x1-xaverage	y1-yaverage	dx*dy	dx^2
-4.5	-187.42	838.6896	
-2.3	-77.42	176.1229	
-6.8	-217.42	1472.998	
-3.5	-70.42	244.6979	
-0.2	3.58	-0.62708	
3.4	119.58	409.5729	
0.7	9.58	6.947917	
6.4	211.58	1359.423	
4.7	141.58	668.9813	
-0.6	18.58	-10.6854	
3.9	42.58	167.1396	
-1.5	5.58	-8.23542	
177.0	174754.9	5325.025	sum of dx*dy

$$r =$$

Pearson r crit.	On .05
	Two
df	.10
1	.988
2	.900
3	.805
4	.729
5	.669
6	.622
7	.582
8	.549
9	.521
10	.497

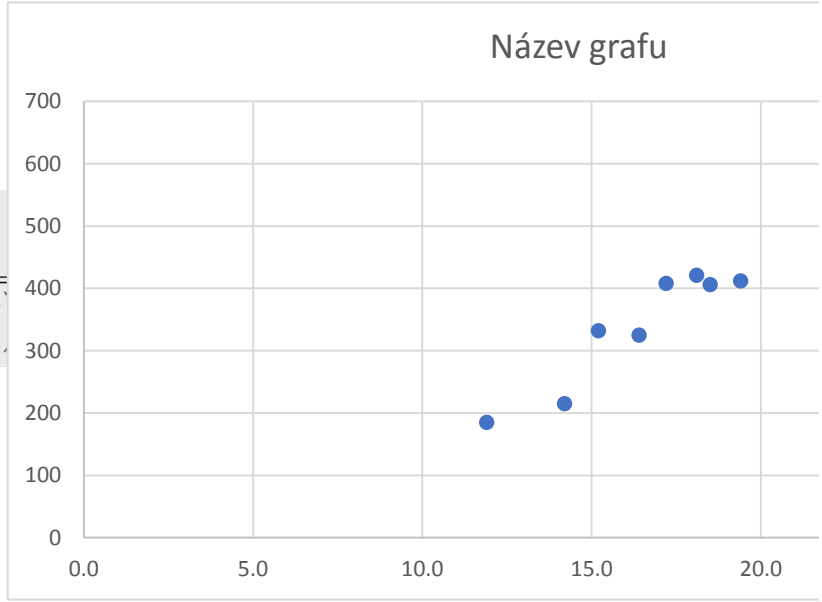
r>crit value
H0 rejected
0.957506623 critical value= 0,576
d.f. 10
alpha 0.05

for the last 12 days:

d
0
-1
0
1
-2
1
-1
0
0
2
-1
1
14
12
1716
0.951049
0.587

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

n \ α	0.2	
4	1.000	1
5	0.800	0
6	0.657	0
7	0.571	0
8	0.524	0
9	0.483	0
10	0.455	0
11	0.427	0
12	0.406	0
13	0.385	0
14	0.367	0
15	0.354	0
16	0.341	0
17	0.328	0



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

ıe-Tailed Test	
.025	.01
ı-Tailed Test	
.05	.02
.997	.9995
.950	.980
.878	.934
.811	.882
.754	.833
.707	.789
.666	.750
.632	.716
.602	.685
.576	.658

0.1	0.05	0.02	0.01
1.000	—	—	—
0.900	1.000	1.000	—
0.829	0.886	0.943	1.000
0.714	0.786	0.893	0.929
0.643	0.738	0.833	0.881
0.600	0.700	0.783	0.833
0.564	0.648	0.745	0.794
0.536	0.618	0.709	0.755
0.503	0.587	0.678	0.727
0.484	0.560	0.648	0.703
0.464	0.538	0.626	0.679
0.446	0.521	0.604	0.654
0.429	0.503	0.582	0.635
0.414	0.488	0.566	0.618

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