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 th
Formulate a null hypothesis and verify it by Pearsons and Spearman coefficients

Ho: there is no correlation between t
H1: there is a correlation between tl

Spearman coefficients

Temperature (°C)	Ice Cream Sales ($)		Rank temperature	Rank ice cream sales
14.2	215		11	11
16.4	325		9	10
11.9	185		12	12
15.2	332		10	9
18.5	406		6	8
22.1	522		4	3
19.4	412		5	6
25.1	614		1	1
23.4	544		2	2
18.1	421		7	5
22.6	445		3	4
17.2	408		8	7

N: 12
N^3:   1728

rs:
critical value:

Ho is rejected, there is a cor

Pearsons coefficients

Average: 18.7   402.42

Diferrences

-4.5	-187.42	838.69	alpha:	0.05
-2.3	-77.42	176.12	D.O.F	10
-6.8	-217.42	1473.00		
-3.5	-70.42	244.70	r:	0.9575
-0.2	3.58	-0.63	critical value:	0.576
3.4	119.58	409.57		
0.7	9.58	6.95		
6.4	211.58	1359.42	Ho is rejected, there is a cor	
4.7	141.58	668.98		
-0.6	18.58	-10.69		
3.9	42.58	167.14		
-1.5	5.58	-8.24		

177.0   174754.92   5325.03

Ice

700

600

500

400

300
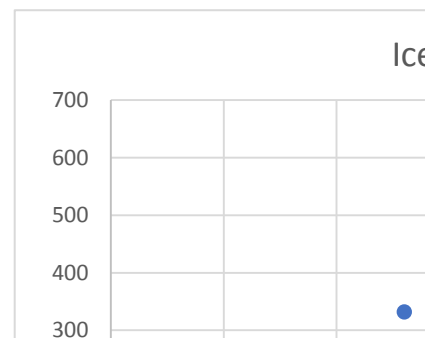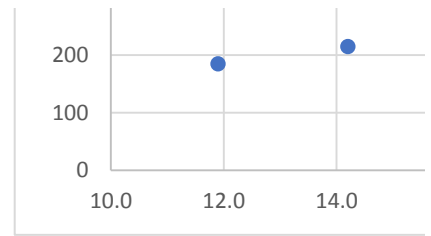
e last 12 days:

the number of ice cream sell and the temparature
he number of ice cream sell and the temparature

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.

difference
0
-1
0
1
-2
1
-1
0
0
2
-1
1

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

14
0.951049
0.587

relation between the number of ice cream sell and the temparature

Two

df	.10
1	.988
2	.900
3	.805
4	.729
5	.669
6	.622
7	.582
8	.549
9	.521
10	.497

relation between the number of ice cream sell and the temparature

$$r = \frac{\sum(X_i}{\sqrt{\sum(X_i-}}$$

e Cream Sales ($)

16.0   18.0   20.0   22.0   24.0   26.0

0.1	0.05	0.02	0.01
.000	—	—	—
.900	1.000	1.000	—
.829	0.886	0.943	1.000
.714	0.786	0.893	0.929
.643	0.738	0.833	0.881
.600	0.700	0.783	0.833
.564	0.648	0.745	0.794
.536	0.618	0.709	0.755
.503	0.587	0.678	0.727
.484	0.560	0.648	0.703
.464	0.538	0.626	0.679
.446	0.521	0.604	0.654
.429	0.503	0.582	0.635
.414	0.488	0.566	0.618
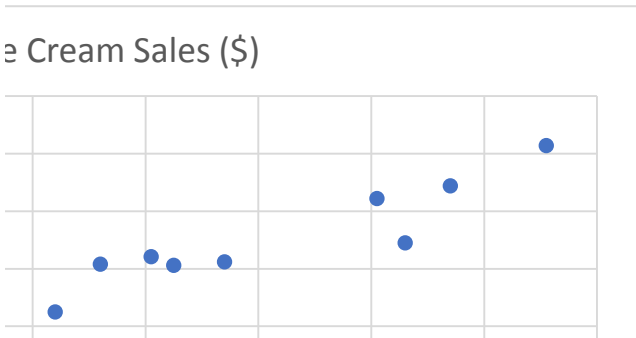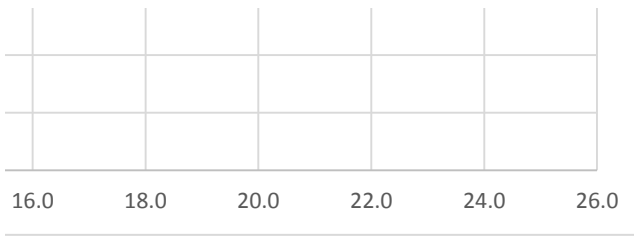
$n \backslash \alpha$	0.2	0.1	0.05	0.02	0.01
18	0.317	0.401	0.472	0.550	0.600
19	0.309	0.391	0.460	0.535	0.584
20	0.299	0.380	0.447	0.522	0.570
21	0.292	0.370	0.436	0.509	0.556
22	0.284	0.361	0.425	0.497	0.544
23	0.278	0.353	0.416	0.486	0.532
24	0.271	0.344	0.407	0.476	0.521
25	0.265	0.337	0.398	0.466	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

e-Tailed Test

.025	.01

-Tailed Test

.05	.02
.997	.9995
.950	.980
.878	.934
.811	.882
.754	.833
.707	.789
.666	.750
.632	.716
.602	.685
.576	.658

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