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

$r =$

the last 12 days:

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

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

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

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				

age (yrs)	price/1000 Kč
3	167
4	165
5	139
6	149
7	119
7	129
8	89
8	115
9	76
9	89

Here is a pricelist of used 10 cars Skoda Felicia Combi

1. pressume normal distribution of the data
2. construct a simple regression model how the price depends on the
3. evaluate quality of the model
4. estimate a price of a ten-year-old Felicia Combi

e age

A new kind of insulin was developed. Its effect was tested as a drop of sugar level in blood 2 hours after the injection application.
8 Randomly selected patients were dozed with different insulin amounts. Results are in the table: **Prove a strong correlation and plot a graph of regression residua**

insuline amount (ug)	150	200	250	300	350	400
sugar level drop (%)	8	12	30	20	55	58

als!

	450	500
	44	65

sugar level drop (%)

$y = 0.1614x - 15.964$

$R^2 = 0.8048$

Fill Outline Series "sugar l ⌄

Delete

Reset to Match Style

Change Series Chart Type...

Select Data...

3-D Rotation...

Add Data Labels ▸

Add Trendline...

Format Data Series...

500   600
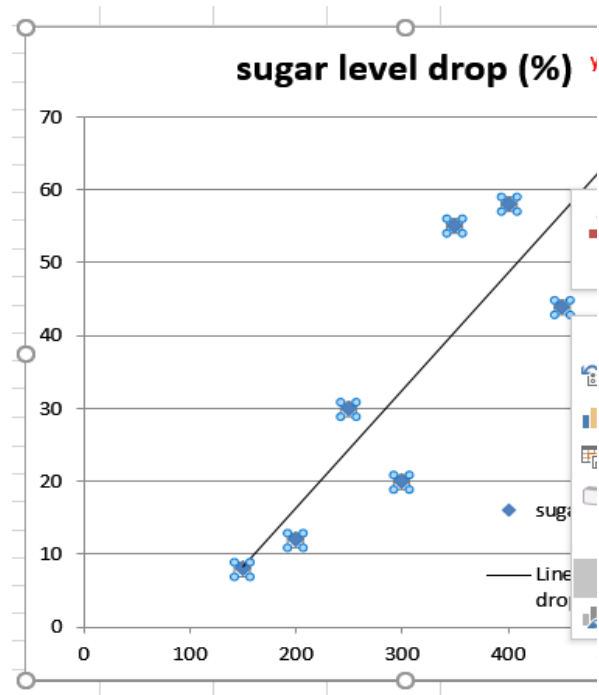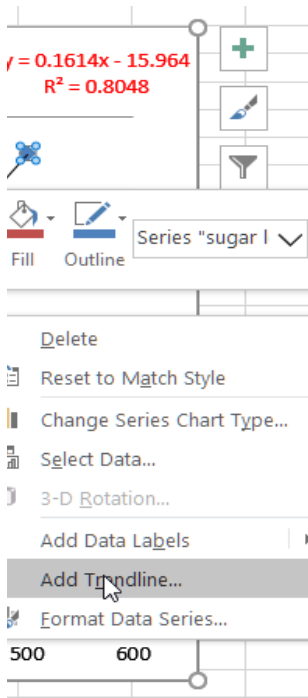
concentration	signal
1	0.195
2	0.425
3	0.565
4	0.851
5	1.142
6	1.198
7	1.530

HOW TO FORCE Const a=0

Function Arguments

LINEST

Known_y's   B2:B8   =

Known_x's   A2:A8   =

Const   1 or 0   =

Stats   1   =

=

Returns statistics that describe a linear trend matching known data po
squares method.

Const is a logical value: the const
or omitted; b is set equal t

Formula result =

Help on this function

= {0.195;0.425;0.565;0.851;1.142;1....

= {1;2;3;4;5;6;7}

=

= TRUE

=

...ints, by fitting a straight line using the least

...tant b is calculated normally if Const = TRUE
...o 0 if Const = FALSE.

OK   Cancel

Data Analysis

Analysis Tools

Fourier Analysis
Histogram
Moving Average
Random Number Generation
Rank and Percentile
Regression
Sampling
t-Test: Paired Two Sample for Means
t-Test: Two-Sample Assuming Equal Variances
t-Test: Two-Sample Assuming Unequal Variance

Regression

Input

Input Y Range: $B$1:$B$8

Input X Range: $A$1:$A$8

☑ Labels   ☑ Constant is Zero
☐ Confidence Level: 95   %

Output options

○ Output Range:
◉ New Worksheet Ply:
○ New Workbook

Residuals

☐ Residuals   ☐ Residual
☐ Standardized Residuals ☐ Line Fit F

Normal Probability

☐ Normal Probability Plots