

List 10

Exercise 1. The process of wrapping gifts in the Santa Claus seat was studied. There were 6 measurements of the number of wrapped gifts (feature Y, in items) depending on the number of elves helping with packing (feature X, in items). The results are presented in the table below:

x_i	8	12	15	20	22	31
y_i	74	129	182	220	260	410

- On the basis of the graph of points with coordinates (x, y) from the table, check what type of relationship between the examined features can be expected.
- Determine the correlation coefficient between the number of elves helping with packing and number of wrapped gifts.
- Calculate the linear regression equation of the number of wrapped gifts depending on the number of elves helping with packing.
- Check the significance of linear regression.
- Add a linear regression function to an existing scatter plot.
- Determine the number of wrapped gifts with 25 elves.
- Determine and interpret the coefficient of determination.

Take a significance level equal to 0.05.

Exercise 2. The weight of Santa's sleigh was examined (feature Y, in t) depending on the time of delivering gifts (feature X, in h). The results are presented in the table below.

x_i	2	4	5	7	10
y_i	120	100	87	60	30

- On the basis of the graph of points with coordinates (x, y) from the table, check what type of relationship between the examined features can be expected.
- Determine the correlation coefficient between the time of delivering gifts and the weight of Santa's sleigh.
- Calculate the linear regression equation of the weight of Santa's sleigh depending on the time of delivering gifts.
- Check the significance of linear regression.
- Add a linear regression function to an existing scatter plot.
- Determine the weight of Santa's sleigh after 8 hours.
- Determine and interpret the coefficient of determination.

Take a significance level equal to 0.05.

Exercise 3. There were 6 measurements of the time y (in min) of compiling the program managing the route by the robot depending on the length of the program written x (in lines of code). The results were obtained

x_i	145	260	405	600	620	763
y_i	4.5	9	14.4	17.5	24	26.7

- On the basis of the graph of points with coordinates (x, y) from the table, check what type of relationship between the examined features can be expected.

- Determine the correlation coefficient between the length of the written program and its compilation time.
- Calculate the linear regression equation of the program compile time depending on the length of the program written.
- Check the significance of linear regression.
- Add a linear regression function to an existing scatter plot.
- Determine the program compilation time with 500 lines of code.
- Determine and interpret the coefficient of determination.

Take a significance level equal to 0.05.

Exercise 4. In order to find out the rate of dissolution of a certain substance in water, the time (feature X) and the amount of undissolved substance in grams (feature Y) were measured every 5 seconds. The results were obtained

x_i	5	10	15	20	25	30	35
y_i	14.1	13.8	12.7	12.3	11.5	11.0	10.3

- On the basis of the graph of points with coordinates (x, y) from the table, check what type of relationship between the examined features can be expected.
- Determine the correlation coefficient between time and the amount of undissolved substance.
- Calculate the linear regression equation for the amount of undissolved substance depending on time.
- Check the significance of linear regression.
- Add a linear regression function to an existing scatter plot.
- Determine the amount of undissolved substance after 22 seconds.
- Determine and interpret the coefficient of determination.

Take a significance level equal to 0.05.

Exercise 5. The lifetime of a certain device (in months) depends on the number of components produced by this device (device efficiency). For a sample of 6 devices of the same type, the following results were obtained:

Efficiency (x_i)	18	20	18	17	15
Lifetime (y_i)	2	3	3	4	5

- On the basis of the graph of points with coordinates (x, y) from the table, check what type of relationship between the examined features can be expected.
- Determine the correlation coefficient between the lifetime of the device and the number of elements produced by this device.
- Calculate the linear regression equation of the lifetime of the device depending on the number of emollients produced by the device.
- Check the significance of linear regression.
- Add a linear regression function to an existing scatter plot.
- Determine the lifetime of the device after producing 15 elements.
- Determine and interpret the coefficient of determination.

Take a significance level equal to 0.05.