No. 29: *Simple linear regression.*

1. Write a program that

   - reads the natural number $n \in \mathbb{N}^*$ and the pairs of data $(x_i, y_i),\ i = 1, \ldots, n$;
   - displays the scatter plot corresponding to the given data in a Cartesian coordinate system;
   - determines and displays the coefficients $\widehat{\beta}_0$ and $\widehat{\beta}_1$ of the predicted regression line $y = \widehat{\beta}_0 + \widehat{\beta}_1$;
   - plots the regression line in the same Cartesian coordinate system as the scatter plot;
   - displays the residuals $e_i = y_i - \widehat{\beta}_0 - \widehat{\beta}_1 x_i,\ i = 1, \ldots, n$.

2. In a study of a free living population of the snake *Vipera bertis*, researchers caught and measured nine adult females. Notice that this data comes in pairs and is given in the table below. For example $(x_1, y_1) = (60, 136)$.

Snake	Length (cm) (x_i)	Weight (g) (y_i)
1	60	136
2	69	198
3	66	194
4	64	140
5	54	93
6	67	172
7	59	116
8	65	174
9	63	145

   Run your program using these data. What is the weight of a snake of length 55 cm, resp. 70 cm according to this model?

3. The total consumption of electric energy in the years 1975-2005 is given in the table below. The task is to carry out a linear regression of the form $y = \widehat{\beta}_0 + \widehat{\beta}_1 x$ through the data.

year x_i	1975	1980	1985	1990	1995	2000	2005
consumption y_i [GWh]	30.663	37.995	42.815	49.951	54.177	60.502	65.199

   Run your program using these data. Compute the forecast $\widehat{y}$ for 2010 and 2013.