Assignment 5 Due: 12.5.2022 (11.10.1443 AH)

Q1- The following table shows the amount of sales and the amount spent on advertising in the years from 2011 to 2015:

Year	2011	2012	2013	2014	2015
Sales	7050	6090	9130	8300	12000
Advertising	570	500	700	600	800

Use Linear Regression to predict the amount of sales if the advertising in a certain year

a- equals Zero
b- equals 1000.

Q2- Assume we have the following data table:

x	y
4	5
5	18
6	11
7	13.5
8	15
10	10
12	11
14	12

Find the coefficients of a polynomial regression of:
a) Degree 2
b) Degree 3
that best fits this data.

Remark: show steps, however, in case of solving a linear system of equations, you can **directly** obtain solutions without showing internal steps (using any software). Remember that we studied how to do that using Python libraries (namely: SciPy). Other steps should be shown.

Q3- Given the points:

(4,10), (5,13), (8, 44), (10,78), (13, 153)

a) Use Non-linear regression (exponential model) to estimate y when x = 18.

b) Use Non-linear regression (power model) to estimate y when x = 18.

Q4- Use Lagrange's interpolation method to estimate f(4)

x	-1	0	3	5
f(x)	8	10	16	20

Q5- Use Newton's Divided Difference interpolation method to estimate:

f(1.5) and f(2.5), where f(x) = $\frac{\sin(x)}{\sqrt{x^2+1}}$

Use the four points x=0, 1, 2, 3
Compute the relative percent error of your two estimates.