Alexandria University
Faculty of Engineering

Introduction to Machine Learning
Assigned: Monday, October 28, 2024
Due: Saturday, November 2,2024

Sheet 3

Linear Regression

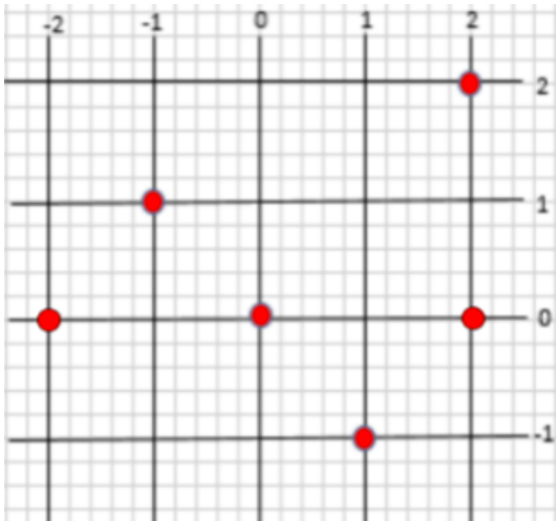
1. Find the least square regression line for the following set of data.
   {(-1,0), (0,2), (1,4), (2,5)}
   then plot the given points and the regression line.

2. The value of x and their corresponding values of y are shown in the table below.

x	0	1	2	3	4
y	2	3	5	4	6

   a) Find the least square regression line $y = ax + b$.
   b) Estimate the value of y when $x = 10$.

3. The Answer the following questions,
   a) Apply linear regression analytic form, use matrix inverse, to find the parameters of the best-fit line through the 6 points {(x,y)}= {(2,2), (0,0), (-1,1), (1,-1), (-2,0), (2,0)},shown in the figure below.
   b) Draw the best-fit line on the answer sheet.
   c) Find the sum of the squared loss.
   d) Discuss how sensitive linear regression to the noise illustrate your answer by finding the best model if we consider the point (2,2) as an outlier.
   e) Estimate y for x=-0.5, x=0.5 and for x=1.5.



Dr. Marwan Torki

Eng. Abdelrahman ElNainay Eng. Abdelrahman Sakr
Eng. Nour Eddine Hassan Eng. Youssef Nawar
Eng. Mohamed Badran