Q1. Consider fitting of data $(x_n, y_n): n = 1,2,\cdots, m$ by a least Square Line $ax + b$. We do this by minimizing the sum of square error $f(a,b) = \sum_{n=1}^{m}(y_n - ax_n - b)^2$ as a function of (a,b).
Find the critical points of f and confirm that it is corresponding to a global minimum.

Find the least square line for the following data.

x_n	1	2	3	4
y_n	1	3	2	4

Q2: Consider the numerical minimization of the function $f(a,b)$ using the Steepest Descend Method. Here we start at a point (a_0,b_0) and follow the direction of the minimum slope of f at (a_0,b_0) until we get the minimum of f at (a_1,b_1) along this selected direction. Then we repeat the process at (a_1,b_1) and so on. Show that such consecutive minimum slope directions are perpendicular.

The function for Q1 is $f(a,b)=30-58a+30a^2-20b+20ab+4b^2$. Write the first two steps of the Steepest Descend Method starting from $(0,0)$.