Home Assignment - 3

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Due on or before: 03.08.2024

Write a computer program (preferably in python) to minimize the following function using steepest descent method

$$f(x_1, x_2) = \left(x_1^2 + x_2 - 11\right)^2 + \left(x_2^2 + x_1 - 7\right)^2$$

Use $x_1^{(0)} = x_2^{(0)} = 0$

Solution converges when norm of descent direction is less than 0.001

Do not use a constant step size, rather use an appropriate line search technique to find the optimum step size. Plot the function as a surface and as contours. Show the path of convergence connecting the points $\left(x_1^{(k)}, x_2^{(k)}\right)$ for $k = 0,1,2,3,\cdots$

Do not use any optimization library, you may use necessary libraries for array operation and plotting (such as numpy and matplotlib).

Put your code, plot, and the written document (if any) in a folder; zip the folder and submit in Mookit.