

BICK-hw10

November 15, 2022

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1 Problem 1

Consider “Rosenbrock” function:

$$f(x, y) = (1 - x_1)^2 + 100(x_2 - x_1^2)^2$$

With a starting point $[0, 0]^T$, apply two iterations of Newton’s method to minimize Rosenbrock function. Hint:

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2 Problem 2

Let $S = \text{span}\{x_1, x_2, x_3\}$, where

$$x_1 = \begin{pmatrix} 1 \\ 1 \\ 0 \\ 0 \end{pmatrix}, x_2 = \begin{pmatrix} 2 \\ 2 \\ 0 \\ -3 \end{pmatrix}, x_3 = \begin{pmatrix} 0 \\ -1 \\ 1 \\ 0 \end{pmatrix}$$

Find an orthonormal basis for S , using Gram-Schmidt process.

3 Problem 3

Write a code and implement the Gauss-Newton Method on the last example given in the lecture, to find A , ω , and ϕ such that the resulting sinusoid $y = A \sin(\omega t + \phi)$ best fits $(t, y_i), i = 1, 2, \dots, 21$, with $t_1 = 0$ and $t_{21} = 10$ and y_i given roughly below.