

Math-484 Homework #11 (iterative methods)

This homework will not be collected or graded. Please do the problems to prepare for the final exam

For all of the following problems, you you are allowed and encouraged to use software for computing product of matrices, inverses of matrices and eigenvalues of matrices.

1: Compute the first two iterates $\mathbf{x}_1, \mathbf{x}_2$ using the Broyden's Method for minimizing the function

$$f(x_1, x_2) = 2x_1^2 + x_2^2 - x_1x_2$$

with initial point $\mathbf{x}_0 = (1, 4)$ and with

- (a) $D_0 = I$
- (b) $D_0 = Hf(\mathbf{x}_0)$

2: Compute the first two terms of the BFGS sequence and the first two terms of the DFP sequence for minimizing the function

$$f(x_1, x_2) = x_1^2 - x_1x_2 + \frac{3}{2}x_2^2$$

starting with the initial point $\mathbf{x}_0 = (1, 2)$ and $D_0 = I$. For each case, choose $t_k > 0$ to be the exact minimizer of $f(\mathbf{x})$ in the search direction from \mathbf{x}_k . *Note that this selection of t_k will certainly satisfy criterion 3 for any $\beta > 0$. Do not worry about criterion 4 for this problem.*