Due Date: 6:00pm, 3 June, 2023

1. Consider again the optimization problem in Q4 of Assignment 1:

$$\min_{x_1,x_2} f(x_1, x_2) = 100(x_2 - x_1^2)^2 + (x_1 - 1)^2$$

It is easy to see that the exact solution to the above problem is $(1, 1)^T$.

Implementing quasi-Newton methods with different update formula using Matlab (or other software you prefer) to solve the above optimization problem:

- DFP formula for H_k
- BFGS formula for H_k
- DFP formula for B_k
- BFGS formula for B_k

Parameters setting-up: initial value $x^0 = [0, 0]^T$, maximum iteration: 50000, stoping criterion: norm of gradient $< 10^{-8}$. (You can verify your result by comparing the output with the exact solution)

Please report all the results of the four methods listed above, and discuss briefly what you can conclude from the results. (For backtracking line search, please choose the parameters carefully such that the algorithm converges as fast as possible)