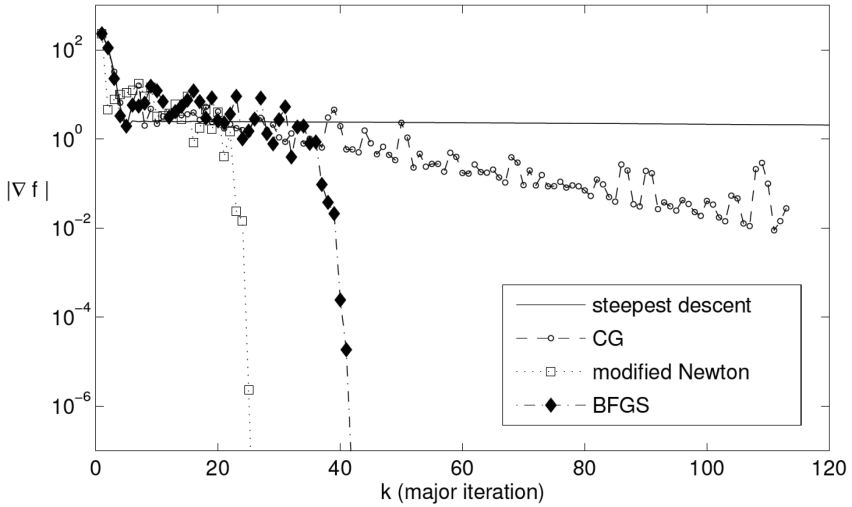
HOMEWORK 4
MAE 206- OPTIMIZATION METHODS
INSTRUCTOR: PROF. SOLMAZ S. KIA

Problem 1. *A comparison between convergence performance of the steepest descent, the modified Newthon, and Quasi Newton methods*
Consider the minimization of the Rosenbrock function

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

Find the minimizer of this function.

Program the steepest descent, modified Newton's and BFGS quasi Newton methods. To obtain the stepsize use Armijo and the quadratic fit line search algorithms (see the hw 4 page on Canvas for sample codes). Use the initial condition $x = -0.2$ and $y = 1$. Stop the algorithm either when $N = 120$ or when $\|\nabla f(x, y)\| \leq 10^{-8}$. Plot (x_k, y_k) of your algorithms over the contour plot of Rosenbrock's function. Also, produce a plot similar to the figure shown below. (You do not need to program the conjugate gradient method).



Comparison of convergence rates for the Rosenbrock function