

## **Math 404 Report#2**

1. Write a MATLAB subroutine, to implement the following 1D minimization algorithms:
  - a) The Fibonacci method.
  - b) The golden section method.
  - c) The quadratic interpolation method.
  - d) The cubic interpolation method.
2. Using MATLAB, implement the following algorithms for solving the unconstrained nonlinear optimization problem:
  - a) Fletcher-Reeves CG Method.
  - b) Marquardt Method.
  - c) Quasi-Newton Method.
3. Utilize the above implemented algorithms to solve the following benchmark problems:
  - a) Rosenbrock's parabolic valley function starting from  $\mathbf{X}_0 = (-1.2, 1.0)$ 
$$f(x_1, x_2) = 100(x_2 - x_1^2)^2 + (1 - x_1)^2$$
  - b) Powell's quartic function starting from  $\mathbf{X}_0 = (3.0, -1.0, 0.0, 1.0)$ 
$$f(x_1, x_2, x_3, x_4) = (x_1 + 10x_2)^2 + 5(x_3 - x_4)^2 + (x_2 - 2x_3)^4 + 10(x_1 - x_4)^4$$

In your analysis, compare the above algorithms using the following criteria:

- a) Number of iterations.
- b) The optimal solution.
- c) The optimal value.
- d) CPU time.

**Deadline: Thursday Dec 5, 2019**