

Math456/CMPSC456 Homework 1

Due Jan 19 2020

1. (15 points) Let $f(x_1, x_2) = e^{x_1-3x_2} + e^{x_1+3x_2} + e^{-x_1}$. Starting with $(0, 0)$, determine the approximation after one step of the Newton's iteration for the minimization problem: $\min f(x_1, x_2)$.

2. (25 points) Computer Problem: Apply the Newton's method and the modified Newton's method ($J(\vec{x}_k) \approx J(\vec{x}_0)$) to the nonlinear equations,

$$x_1^2 - x_2^2 + 2x_2 = 0, 2x_1 + x_2^2 - 6 = 0.$$

with initial guess $(-5, -4)$. With the tolerance $TOL = 10^{-9}$, compare the number of iterations needed before convergence. (Attach the code).