Given the function \( f : \mathbb{R}^4 \rightarrow \mathbb{R} \), where

\[
2.0 \cdot f(\bar{x}) = \left( \sqrt{x_2^2 + 2.0309 - 1.4884} \right)^2 + \left( \sqrt{(x_2 - x_1)^2 + (x_3 - 1.4251)^2 + 1.2217 - 2.5061} \right)^2 \\
+ \left( \sqrt{x_3^2 + x_3^2 + 1.2217 - 1.4897} \right)^2 \\
+ (x_4 - 1.5682)^2 \\
+ \left( \sqrt{(x_4 - x_2)^2 + x_3^2 + 1.2217 - 2.5393} \right)^2
\]

write computer programs to find the minimum of this function using:

1. “Modified” Newton’s Method (add 1.45 to diagonal) with no Line Search
2. “Modified” Newton’s Method with Quadratic/Cubic Backtracking Line Search

Use an initial vector of \((0.0, 0.0, 1.5, -10.0)\). Use the norm of the gradient as a stopping condition, with a tolerance of 0.004. Do not use built-in Matlab functions to calculate the gradient, calculate the Hessian, or solve the linear system of equations at each Newton iteration. Use the grad_fd.m, hess_fd.m, and sor.m functions provided.

Hand in a copy of your computer program(s) (via email), a plot showing norm of gradient vs. iteration comparisons, and a plot showing function value vs. iteration comparisons.