Newton Report

1. Problem

Implement newton method algorithm for finding root of nonlinear equation.

2. Description of Work

1) Make nonlinear function file f2.m and f2’

Here ,

2) Make Test routing test\_newton.m

This function has several roots {-1, 0, 3}, so in order to get all roots, should provide several initial guess.

3) Implement newton.m function

Step1: r = x0

Step2:For k = 1,2,…,nmax

Step2.1 err = f(r) /f’(r)

Step2.2 if abs(err) < tol then return r, otherwise r = r – err

Step3 End For

3. Discussion of test results

When run test\_newton.m script with tolerance of , maxit = 100. test result is as follow.

Initial guest = -3, tol = 1e-6, root = -1.0000000000938949, iter = 9

Initial guest = -3, tol = 1e-10, root = -1.0000000000938949, iter = 9

Initial guest = 1, tol = 1e-6, root = 1.1554231078801118e-06, iter = 21

Initial guest = 1, tol = 1e-10, root = 4104296847805910e-10, iter = 34

Initial guest = 2, tol = 1e-6, root = -1, iter = 2

Initial guest = 2, tol = 1e-10, root = -1, iter = 2

Initial guest = 4, tol = 1e-6, root = 3.0000000042702939, iter = 6

Initial guest = 4, tol = 1e-10, root = 3, iter = 7

4. Explanation of results, answers to questions.

Newton algorithm give different result according to initial guess.

Initial Guess = -3 => root = -1

Initial Guess = -1 => root = 0

Initial Guess = 2 => root = -1

Initial Guess = 4 => root = 3

- How does the performance of Newton’s method change as you vary the initial guess?

When change initial guess, iteration count vary.

For example, when start from 1, newton method find room at 21, 34 iterations.

But if start from 2, algorithm terminates at 2 iterations.

-How does Newton’s method change as you vary the tolerance?

The smaller tolerance is, the bigger iteration count is.

For example, Initial guest = 1, tol = 1e-6 requires 21 iterations.

But when tol = 1e-10, it requires 34 iterations.