



Numerical Computing (MTH475)

Dated: 17, April 2025.
Class: BSSE & BSCS
Time Allowed: 90 Minutes.

Mid Term Exam: Spring 2025.
Faculty Member: Dr. Farooq Ahmed Shah.
Maximum Marks: 25.

Attempt all questions. Use of scientific calculator is allowed. Avoid unnecessary detail.

1. Determine the exact value while
 - (i) Approximation for the desired value is 0.989×10^{-16} and Relative error is calculated as 0.002.
 - (ii) The Absolute error and Relative error are 0.0045×10^{-17} and 0.0045, respectively. (6)
2. Derive Newton method for finding roots of nonlinear equations by using Taylor series. Derive the specific iterative formula for obtaining the approximate value of $\sqrt{A}$ by using Newton method. (8)
3. Apply Gauss-Seidal method to solve the following system of equations
$$\begin{aligned} 3x_1 + 20x_2 - x_3 &= -18, \\ 20x_1 + x_2 - 2x_3 &= 17, \\ 2x_1 - 3x_2 + 20x_3 &= 25. \end{aligned}$$
Take $x^{(0)} = (0.85, -1.0275, 1.010875)^T$ as an initial guess to obtain $x^{(2)}$. (8)
4. For the data analysis measurement of the magnitude of vector is required. Keeping the definition of Norms in your mind find $\|x\|_1, \|x\|_2$ and $\|x\|_\infty$, where $x = (5, -4, 1, 8)^T$ (3)

Good Luck