

23B0416

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Assignment 2

The objective of this assignment is to implement and solve non-linear equations using four numerical methods: the Bisection method, Newton-Raphson method, Secant method, and Fixed-Point Iteration method. You will write Python code to implement each method and apply it to solve all of the given non-linear equations:

1. Non-Linear Equations

Non-Linear Equations	Bisection	Newton-Raphson	Secant	Fixed-Point Iteration
$e^{-x} - x = 0$	0.567 (20)	0.56714 (4)	0.562 (5)	0.567 (22)
$x^3 - x - 2 = 0$	1.521 (23)	1.5213 (5)	division by 0	1.5213
$\cos(x) - x = 0$	0.739 (20)	0.73908 (4)	0.739 (4)	0.7390
$x^3 - 2x^2 + 4 = 0$	-1.13 (22)	-1.13039 (4)	-1.13 (11)	-1.13

2. Use Newton-Raphson method and Fixed-Point Iteration method to solve the following multivariate coupled equations:

Non-Linear Equations	Newton-Raphson	Fixed-Point Iteration
$x^2 + y^2 = 5 \text{ & } xy = 2$	$x=2 \ y=1 \ (5)$	$x=2 \ y=1 \ (20)$

- Submit a Python script or Jupyter Notebook with the implementations of all four methods.
- Ensure your code is well-documented with comments explaining the logic behind each step.
- Fill the table with the roots found for each and submit it in a separate PDF file.
- Also mention the number of iterations that was required to solve for each.