

PROJECTS

- I. Project 1
 - A. Solving Equations of a Single Variable (think of finding the zeroes of a polynomial of 10,000 degrees)
 - 1. Bisection
 - 2. Fixed-point
 - 3. Newton's method
 - B. Systems of Equations
 - 1. Linear
 - a. Gaussian Elimination
 - b. LU Decompositions
 - c. Iterative Methods – Jacobi, SOR
 - 2. Nonlinear
 - a. Multi-variable Newton's method
 - b. Broyden's methods
- II. Project 2
 - A. Interpolation
 - 1. Chebyshev
 - 2. Splines (cubic)
 - 3. Bezier
 - B. Least Squares
 - 1. Linear
 - 2. Nonlinear
 - C. Differentiation and Integration
 - 1. Differentiation
 - a. Difference methods
 - b. Extrapolation
 - c. Automatic differentiation (my notes, references)
 - 2. Integration
 - a. Newton-Cotes – Trapezoidal, Simpson
 - b. Romberg
 - c. Adaptive
 - d. Gaussian

*** I will send test problems for the analysis as well as possible further instructions once persons who have signed up for the class decide to continue.

Note: You need include in your software methods to determine the accuracy of the solution. That is, you need to include error analysis.