

ENG ME 700: Computational Mechanics: Nonlinear Analysis
and Software Development
Assignment # 1: Introduction to Non-linear Equations
Current as of January 20, 2025

Warm-up: Getting Started + Bisection Method

- Read <https://github.com/Lejeune-Lab-Graduate-Course-Materials/setup-example> and follow the instructions to get started.
- Implement a bisection method solver using TDD and good coding and documentation practices. Please consider error handling as well.
- Create a tutorial for using your solver with at least 5 example problems, at least 2 of which must be related to mechanics.

Part 1: Newton's Method

- Implement a Newton's method solver using TDD and good coding and documentation practices. Please consider error handling as well.
- Create a tutorial for using your solver with at least 5 example problems, at least 2 of which must be related to mechanics (example problems can match the Bisection Method, though they should be chosen to highlight the functionality/limitations of the Newton's method solver as needed).

Part 2: 1D Elasto-plastic Material Model

- Implement an elasto-plastic material model with kinematic hardening and an elasto-plastic material model with isotropic hardening using TDD and good coding and documentation practices.
- Create a tutorial for using your code with at least 5 example problems.