NUMERICAL COMPUTING

# PROJECT

**Introduction:**

Course Project to implement numerical analysis methods for approximating solutions that have been taught throughout the semester into MATLAB/C++ code.

Choice of programming language: MATLAB

Reason/s: To learn a new language (No prior MATLAB experience) and allow for user-input (e.g. expressions/data) which would not be possible on C++

The following methods/formulae were implemented:

1. Solution of nonlinear equation:
   1. Bisection
   2. Fixed Point
   3. False-Position
   4. Newton
   5. Secant
2. Interpolation
   1. Lagrange
   2. Newtons Simple Difference Table
      1. Forward
      2. Central
      3. Backward
   3. Newtons Divided Difference Table
3. Numerical Integration
   1. Trapezoidal
   2. Midpoint
   3. Simpson’s
   4. Boole’s
4. Solution of ordinary differential equation
   1. Euler’s
   2. Heun’s
   3. Runge-Kutta (4th order)

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**References:**

* <https://www.mathworks.com/>
* <https://en.wikipedia.org/wiki/Numerical_analysis>
* Numerical Analysis (9th edition) by Richard L. Burden & J. Douglas Faires
* Comparison of numerical integration methods by Alicja Winnicka