

Numerical Solutions to Differential Equations

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This unit will cover some of the techniques for solving problems involving differential equations numerically and implementing these techniques on MATLAB. The differential equations will range from initial value to problems to more complicated partial differential equations with many different implemented conditions. The unit layout will be as follows:

1. Solving Linear Systems of Equations
 - i. Direct Methods
 - ii. Iterative Methods
2. Solving Initial Value Problems
 - i. Euler Method
 - ii. Modified Euler Method
 - iii. Runge-Kutta Methods
 - iv. Implicit Methods
 - v. MATLAB's In-Built Mechanisms
3. Solving Boundary Value Problems
 - i. Finite Difference Approximations
 - ii. Mixed Value Problems
 - iii. Symmetric Boundary Value Problems
4. Solving Partial Differential Equations
 - i. Method of Lines
 - ii. Accuracy & Convergence