

Introduction to Week Three

Gaussian Elimination

Operation Counts

Eigenvalues and Eigenvectors

Matrix Algebra in MATLAB

Systems of Nonlinear Equations

✔ **Video:** Systems of Nonlinear Equations | Lecture 33
10 min

✔ **Reading:** How to Solve Three Nonlinear equations
5 min

▶ **Video:** Systems of Nonlinear Equations (Example) | Lecture 34
9 min

🔗 **Ungraded External Tool:** Fixed-Point Solutions of the Lorenz Equations
10 min

Quiz

Programming Assignment:
Fractals from the Lorenz
Equations

How to Solve Three Nonlinear equations

The algorithm for solving the system of two equations and two unknowns,

$f(x,y)=0, \qquad g(x,y)=0,$

is given by the following two-step process.

1. Solve the linear system for Δx_n and Δy_n given by

$\begin{pmatrix} f_x & f_y \\ g_x & g_y \end{pmatrix} \begin{pmatrix} \Delta x_n \\ \Delta y_n \end{pmatrix} = \begin{pmatrix} -f \\ -g \end{pmatrix}.$

2. Advance the iterative solution, using

$x_{n+1} = x_n + \Delta x_n, \qquad y_{n+1} = y_n + \Delta y_n.$

Write down the corresponding algorithm for three equations and three unknowns.

✔ **Completed** **Go to next item**

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