Introduction to Week Three

Gaussian Elimination

Video: Gaussian Elimination without Pivoting | Lecture 24
11 min

Reading: Round-off Errors in Gaussian Elimination
10 min

Video: Gaussian Elimination with Partial Pivoting | Lecture 25
5 min

Reading: Reduced Round-off Errors in Gaussian Elimination with Partial Pivoting
5 min

Video: LU Decomposition with Partial Pivoting | Lecture 26
10 min

Reading: The (PL)U Decomposition of A
10 min

Operation Counts

Eigenvalues and Eigenvectors

Matrix Algebra in MATLAB

Systems of Nonlinear Equations

Quiz

Programming Assignment: Fractals from the Lorenz Equations

Round-off Errors in Gaussian Elimination

Consider again the system of equations given by

$$\epsilon x_1 + 2x_2 = 4, \qquad x_1 - x_2 = 1.$$

The solution of these equations using Gaussian elimination without pivoting was found to be

$$x_2 = \frac{-\frac{4}{\epsilon} + 1}{-\frac{2}{\epsilon} - 1}, \qquad x_1 = \frac{4 - 2x_2}{\epsilon}.$$

Compute the value of x_2 and x_1 using MATLAB as a calculator. Now, repeat this calculation for the system of equations given by

$$2\epsilon x_1 + 2x_2 = 4, \qquad x_1 - x_2 = 1.$$