

Introduction to Week Three

Gaussian Elimination

Operation Counts

- ✓

**Video:** Operation Counts | Lecture 27  
9 min
- ✓

**Reading:** Estimating Computational Time using Operation Counts  
5 min
- ✓

**Video:** Operation Counts for Gaussian Elimination | Lecture 28  
8 min
- ✓

**Reading:** Summation Identities  
10 min
- ✓

**Video:** Operation Counts for Forward and Backward Substitution | Lecture 29  
6 min
- ✓

**Reading:** Operation Counts for a Lower Triangular System  
10 min

Eigenvalues and Eigenvectors

Matrix Algebra in MATLAB

Systems of Nonlinear Equations

Quiz

Programming Assignment:  
Fractals from the Lorenz  
Equations

Operation Counts for a Lower Triangular System

Solve the following lower triangular system for  $x_i$  in terms of  $x_j, j < i$ :

$$\begin{pmatrix} a_{11} & 0 & \cdots & 0 & 0 \\ a_{21} & a_{22} & \cdots & 0 & 0 \\ \vdots & \vdots & \ddots & \vdots & \vdots \\ a_{(n-1)1} & a_{(n-1)2} & \cdots & a_{(n-1)(n-1)} & 0 \\ a_{n1} & a_{n2} & \cdots & a_{n(n-1)} & a_{nn} \end{pmatrix} \begin{pmatrix} x_1 \\ x_2 \\ \vdots \\ x_{n-1} \\ x_n \end{pmatrix} = \begin{pmatrix} b_1 \\ b_2 \\ \vdots \\ b_{n-1} \\ b_n \end{pmatrix}.$$

Count the total number of multiplication-additions required for a complete solution.

✓ Completed

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