

Gaussian Elimination plays a big role in the first chapters...

Gaussian Elimination

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 1.2 Row Reduction and Echelon Forms 12
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 1.10 Linear Models in Business, Science, and Engineering Supplementary Exercises 89

Maybe already seen

Justify

Chapter 2 Matrix Algebra 93

INTRODUCTORY EXAMPLE: Computer Models in Aircraft I

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 2.9 Dimension and Rank 155

important why it linear alg works

Spiral method of teaching mathematics...keep switching back and forth between topics to give people a chance to catch up...

2.8 Subspaces of \mathbb{R}^n 148
 2.9 Dimension and Rank Supplementary Exercise

Chapter 3 Determinants 165

INTRODUCTORY EXAMPLE: Rain

3.1 Introduction to Determinants
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 3.3 Cramer's Rule, Volume Supplementary Exercise

Chapter 4 Vector Spaces 191

INTRODUCTORY EXAMPLE: Space Flight

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Linear works

enough more in strange

We take a break discussing dimension and rank

Catch up with dimension and rank while learning determinant so everyone can continue together in chapter 4...

Learning more about dimension and rank...

Chapter 5 Eigenvalues and Eigenvectors

Gaussian Elimination
Theory of Determinants
great stuff

INTRODUCTORY EXAMPLE: Dynamical Systems

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Same thing happens here...

Take a break from the eigenvalue eigenvector problem to discuss Gram-Schmidt and least squares...

Chapter 6 Orthogonality and Least Squares

New algorithm

Strained engineers

INTRODUCTORY EXAMPLE: The North American GPS Navigation

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Chapter 7 Symmetric Matrices and Quadratic Forms

Finish line
generalization of eigenvalue problem

INTRODUCTORY EXAMPLE: Multivariable Calculus

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7.4	The Singular Value Decomposition	
7.5	Applications to Image Processing	
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This gives people time to catch up with the eigenvalue and eigenvectors before Chapter 7 which generalizes the eigenvalue eigenvector problem...to create the singular value decomposition...

Chapter 8 The Geometry of Vector Spaces

INTRODUCTORY EXAMPLE: The Plane

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While the spiral method at first looks like someone threw the pages for the book down the stairs and then put them back together in a random order...

The advertising claims that it allows those who fall behind time to catch up while other topics are being discussed while at the same time providing something new each time for people who keep pace with the course...

I'd prefer to cover one topic in depth before going on to the next topic... In either case, the thing to remember is that techniques get used again and again once learned, so it's never useful to forget a topic once the chapter is done...

• The structure and meaning of Matrix-matrix multiplication

$$\begin{cases} g(x) = Ux \\ h(y) = Ly \end{cases}$$

LU is the matrix corresponding to the linear function given by $h \circ g$.

$$U = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 1 & 0 & -2 \end{bmatrix} \quad x = \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix}$$

row interpretation

$$Ux = \begin{bmatrix} x_1 + 2x_2 + 3x_3 \\ 4x_1 + 5x_2 + 6x_3 \\ x_1 + 0x_2 - 2x_3 \end{bmatrix}$$

column interpretation

$$Ux = \begin{bmatrix} 1 \\ 4 \\ 1 \end{bmatrix} x_1 + \begin{bmatrix} 2 \\ 5 \\ 0 \end{bmatrix} x_2 + \begin{bmatrix} 3 \\ 6 \\ -2 \end{bmatrix} x_3$$

Matrix - Matrix Mult

$$A = \begin{bmatrix} 1 & 0 & 2 \\ -1 & 2 & 3 \\ 2 & -1 & 5 \end{bmatrix}$$

$$B = \begin{bmatrix} 0 & 2 & 1 \\ -2 & 3 & 7 \\ 2 & 1 & 0 \end{bmatrix}$$

Find AB i.e. Matrix the gives the composition of the lin. functions for A & B .

row-col method...

$$B = \begin{bmatrix} 0 & 2 & 1 \\ -2 & 3 & 7 \\ 2 & 1 & 0 \end{bmatrix}$$

$$A = \begin{bmatrix} 1 & 0 & 2 \\ -1 & 2 & 3 \\ 2 & -1 & 5 \end{bmatrix} \begin{matrix} \text{row} \\ \text{col} \end{matrix} \begin{matrix} \text{row} \\ \text{col} \end{matrix} \begin{bmatrix} 4 & 4 & 1 \\ 2 & 7 & 13 \\ 12 & 6 & -5 \end{bmatrix} = AB$$

$$A = \begin{bmatrix} r_1 \\ r_2 \\ r_3 \end{bmatrix}$$

$$B = \begin{bmatrix} c_1 & c_2 & c_3 \end{bmatrix}$$

$$(AB)_{ij} = r_i \cdot c_j$$

Matrix-Matrix mult. in terms of Matrix vector mult.

$$AB = A \left[\begin{array}{c|c|c} c_1 & c_2 & c_3 \end{array} \right] = \left[\begin{array}{c|c|c} Ac_1 & Ac_2 & Ac_3 \end{array} \right]$$

a way of writing a whole bunch
of Matrix vector operations...
