Elementary Linear Algebra

Applications Version

NINTH EDITION

A STANTANT OF THE STANTANT OF

CHAPTER 1	Systems of Linear Equations and Matrices	
	1.2 Gaussian Elimination 8 1.3 Matrices and Matrix Operations 23 1.4 Inverses: Rules of Matrix Arithmetic 39 1.5 Elementary Matrices and a Method for Finding A 51 1.6 Further Results on Systems of Equations and Invertibility 60 1.7 Diagonal, Triangular, and Symmetric Matrices 68	
CHAPTER 2	Determinants	1000
	2.1 Determinants by Cofactor Expansion 84 2.2 Evaluating Determinants by Row Reduction 96 2.3 Properties of the Determinant Function 103 2.4 A Combinatorial Approach to Determinants 111	83
CHAPTER 3	Vectors in 2-Space and 3-Space	
	3.1 Introduction to Vectors (Geometric) 124 3.2 Norm of a Vector; Vector Arithmetic 131 3.3 Dot Product; Projections 136 3.4 Cross Product 144 3.5 Lines and Planes in 3-Space 156	123:
CHAPTER 4	Euclidean Vector Spaces	
	4.1 Euclidean n-Space 168 4.2 Linear Transformations from R* to R** 181	167
	4.3 Properties of Linear Transformations from R" to R" 197 4.4 Linear Transformations and Polynomials 210	
CHAPTER 5	General Vector Spaces	
	5.1 Real Vector Spaces 222 5.2 Subspaces 229 5.3 Linear Independence 240	221

	5.6 Rank and Nullity 279	
CHAPTER 6	Inner Product Spaces 6.1 Inner Products 296 6.2 Angle and Orthogonality in Inner Product Spaces 307 6.3 Orthonormal Bases; Gram-Schmidt Prodeess; QR-Decomposition 6.4 Best Approximation; Least Squares 332 6.5 Change of Basis 341 6.6 Orthogonal Matrices 347	295
CHAPTER 7	Figenvalues, Eigenvectors 7.1 Eigenvalues and Eigenvectors 360 7.2 Diagonalization 369 7.3 Onhogonal Diagonalization 380	359
CHAPTER 8	Linear Transformations 8.1 General Linear Transformations 390 8.2 Kernel and Range 400 8.3 Inverse Linear Transformations 407 8.4 Matrices of General Linear Transformations 416 8.5 Similarity 430 - 8.6 Isomorphism 442	389
CHAPTER 9	Additional Topics 9.1 Application to Differential Equations 452 9.2 Geometry of Linear Operators on R ² 458 9.3 Least Squares Fitting to Data 468 9.4 Approximation Problems: Fourier Series 474 9.5 Quadratic Forms 479 9.6 Diagonalizing Quadratic Forms: Conic Sections 487 9.7 Quadric Surfaces 497 9.8 Comparison of Procedures for Solving Linear Systems 502 9.9 LU-Decompositions 511	451
CHAPTER 10	Complex Vector Spaces 10.1 Complex Numbers 522 10.2 Division of Complex Numbers 528 10.3 Polar Form of a Complex Number 533 10.4 Complex Vector Spaces 540 10.5 Complex Inner Product Spaces 547 10.5 Complex Inner Product Spaces 547	55

5.4 Basis and Dimension

250

CHAPTER 11	Applications of Linear Co.	Contents +	XA
CHAPTER 11	Applications of Linear Algebra 11.1 Constructing Curves and Surfaces through Specified Pulms 11.2 Electrical Networks 374 11.3 Geometric Linear Programming 578 11.4 The Earliest Applications of Linear Algebra 590 11.5 Cubic Spline Interpolation 597 11.6 Markov Chains 608 11.7 Graph Theory 619 11.8 Games of Strategy 629 11.9 Leontief Economic Models 639 11.10 Forest Management 648 11.11 Computer Graphics 657 11.12 Equilibrium Temperature Distributions 665 11.13 Computed Tomography 676 11.14 Fractals 688 11.15 Chaos 705 11.16 Cryptography 719 11.17 Genetics 732 11.18 Age-Specific Population Growth 743		567
	11.19 Harvesting of Animal Populations 743 11.20 A Least Squares Model for Human Hearing 762 11.21 Warps and Morphs 768		

INDEX