

MATRICES AND TRANSFORMATIONS

Anthony J. Pettofrezzo

Department of Mathematical Sciences and Statistics

Florida Technological University

Orlando, Florida

DOVER PUBLICATIONS, INC.
NEW YORK

Contents

1	MATRICES	1
1-1	Definitions and Elementary Properties	1
1-2	Matrix Multiplication	6
1-3	Diagonal Matrices	13
1-4	Special Real Matrices	15
1-5	Special Complex Matrices	19
2	INVERSES AND SYSTEMS OF MATRICES	22
2-1	Determinants	22
2-2	Inverse of a Matrix	28
2-3	Systems of Matrices	35
2-4	Rank of a Matrix	41
2-5	Systems of Linear Equations	46
3	TRANSFORMATIONS OF THE PLANE	51
3-1	Mappings	51
3-2	Rotations	53
3-3	Reflections, Dilations, and Magnifications	58
3-4	Other Transformations	63
3-5	Linear Homogeneous Transformations	66

3-6 Orthogonal Matrices	68
3-7 Translations	71
3-8 Rigid Motion Transformations	76
 4 EIGENVALUES AND EIGENVECTORS	 83
4-1 Characteristic Functions	83
4-2 A Geometric Interpretation of Eigenvectors	87
4-3 Some Theorems	89
4-4 Diagonalization of Matrices	92
4-5 The Hamilton-Cayley Theorem	97
4-6 Quadratic Forms	101
4-7 Classification of the Conics	103
4-8 Invariants for Conics	109
 BIBLIOGRAPHY	 112
 ANSWERS TO ODD-NUMBERED EXERCISES	 114
 INDEX	 129