
CONTENTS

<i>Preface</i>	vii
1 Gaussian elimination	1
Description and application of an algorithm to reduce a matrix to row echelon form. Partial pivoting.	
2 Solutions to simultaneous equations 1	11
Use of the GE algorithm. The different possible outcomes. Inconsistent equations. Solutions involving arbitrary parameters.	
3 Matrices and algebraic vectors	23
Sums and products of matrices. Algebraic laws. Simultaneous linear equations considered as a single matrix equation.	
4 Special matrices	33
Zero matrix, diagonal matrices, identity matrix, triangular matrices. Transpose of a matrix, symmetric and skew-symmetric matrices. Elementary matrices and their relation with elementary row operations.	
5 Matrix inverses	45
Invertible and singular matrices. Algorithm for finding inverses. Inverses of products.	
6 Linear independence and rank	55
Algorithms for testing linear dependence or independence. Rank of a matrix. Equivalence of invertibility with conditions involving rank, linear independence and solutions to equations (via the GE algorithm).	
7 Determinants	65
2×2 and 3×3 determinants. Methods for evaluation. Effects of elementary row operations. A matrix is invertible if and only if its determinant is non-zero. Determinant of a product. Adjoint matrix. Indication of extension to larger determinants.	
8 Solutions to simultaneous equations 2	81
Rules involving the ranks of matrices of coefficients and whether the matrix is invertible.	

Cambridge University Press

978-0-521-31041-3 - A First Course in Linear Algebra: With Concurrent Examples

A. G. Hamilton

Table of Contents

[More information](#)

vi	<i>Contents</i>	
9	Vectors in geometry	87
	Representing vectors by directed line segments. Algebraic operations interpreted geometrically. The Section Formula. The standard basis vectors i, j, k . The length of a vector.	
10	Straight lines and planes	105
	Straight lines using vector equations. Direction ratios. Scalar product of two vectors. Angles between lines. Planes. Intersections of planes.	
11	Cross product	123
	Definition and properties of the vector product. Areas and volumes. Scalar triple product. Coplanar vectors. Link with linear dependence via determinants.	
	<i>Answers to exercises</i>	134
	<i>Sample test papers</i>	140
	<i>Further reading</i>	146
	<i>Index</i>	147