## CONTENTS

CHAPTER 1	Some basic concepts	1
	1.1 Sets	1
	1.2 The real numbers	11
CHAPTER 2	Coordinates, functions, and graphs	16
	2.1 Coordinates on a line	16
	2.2 Coordinates in a plane	17
	2.3 Coordinates in space	19
	2.4 The distance formula	23
	2.5 Functions and graphs	27
	2.6 Relations and graphs	32
CHAPTER 3	Straight lines and circles in the plane	41
	3.1 Slope of a line	41
	3.2 Equation of a line in 82	44
	3.3 Linear inequalities	47
	3.4 Parallel and perpendicular lines	50
	3.5 Lines through the point of intersection of tw	7 <b>0</b>
	given lines	53
	3.6 Circles	55
	3.7 Analytic proofs of geometric theorems	<b>5</b> 9
CHAPTER 4	Vectors	62
	4.1 Translations	62

## x Contents

	4.2	Directions in $\mathcal{E}_3$ ; vectors	67	
	4.3	Alibi translations in 83	<b>72</b>	
	4.4	Addition of vectors	<b>74</b>	
	4.5	Multiplication by scalars	75	
	4.6	Inner products and the angle between two		
		vectors	76	
	4.7	Applications to geometry in $\mathcal{E}_2$	80	
CHAPTER 5	Planes, lines, and spheres in $\mathcal{E}_3$			
	5.1	Equation of a plane	87	
	5.2	Parametric equations of a line	91	
	5.3	The line of intersection of two planes	94	
	<b>5.4</b>	Linear inequalities and linear programming		
		problems	99	
	5.5	Spheres	113	
CHAPTER 6	Con	nics and quadrics	118	
	6.1	The conics	118	
	6.2	The ellipse	119	
	6.3	The hyperbola	123	
	6.4	The parabola	127	
	6.5	The conics; an alternative approach	131	
	6.6	The quadric surfaces	133	
	6.7	Curves in 83	147	
CHAPTER 7	Vec	ctor spaces and transformations of		
		rdinates	151	
	7.1	Vector spaces	15]	
	7.2		157	
	7.3	<del>-</del>	161	
	7.4	_	168	
	7.5	<del>-</del>	17	
	7.6		173	
CHAPTER 8	Ma	trices, determinants, and linear equations	18	
	8.1	Matrices	183	
	8.2		19	
	0.2	"TWOTTOOD WAY A JANUARY OF THE PARTY I.I.		

	хi
8.3 Determinants of order 2	203
8.4 Determinants of order 3	206
8.5 Properties of determinants	207
8.6 Cramer's rule and multiplication of determi-	
nants	214
8.7 Permutations	217
8.8 Determinants of order $n$	218
8.9 Volume of a parallelepiped	222
CHAPTER 9 Orthogonal transformations and	
rotations in $\mathcal{E}_3$	227
9.1 Orthonormal bases and orthogonal trans-	
formations	227
9.2 Rotations and refreetiens	230
9.5 The axis of a foldation in 03	234
9.4 The general second-degree equation in $x_1, x_2, x_3$	236
9.5 Quadratic forms	237
9.6 Diagonalization of a real symmetric matrix of	
order 3	239
9.7 The <i>n</i> -dimensional case	248
CHAPTER 10 Polar coordinates and complex numbers	250
10.1 Radian measure of angles	250
10.2 Polar coordinates	254
10.3 The complex numbers	259
10 4 Factorization of polynomials	264
10.5 Geometric representation of complex numbers	267
	270
10.6 Complex numbers and vectors	273

10.8 Mappings of the complex plane

INDEX

277291