

CONTENTS

Chapter 1	<u>General Linear Groups</u>	1
A.	Groups	1
B.	Fields, Quaternions	7
C.	Vectors and Matrices	12
D.	General Linear Groups	15
E.	Exercises	19
Chapter 2	<u>Orthogonal Groups</u>	23
A.	Inner Products	23
B.	Orthogonal Groups	25
C.	The Isomorphism Question	29
D.	Reflections in \mathbb{R}^n	31
E.	Exercises	33
Chapter 3	<u>Homomorphisms</u>	35
A.	Curves in a Vector Space	35
B.	Smooth Homomorphisms	41
C.	Exercises	43
Chapter 4	<u>Exponential and Logarithm</u>	45
A.	Exponential of a Matrix	45
B.	Logarithm	49
C.	One-parameter Subgroups	51
D.	Lie Algebras	56
E.	Exercises	59
Chapter 5	<u>SO(3) and Sp(1)</u>	61
A.	The Homomorphism $\rho : S^3 \rightarrow SO(3)$	61
B.	Centers	64
C.	Quotient Groups	67
D.	Exercises	71
Chapter 6	<u>Topology</u>	73
A.	Introduction	73
B.	Continuity of Functions, Open Sets, Closed Sets	74
C.	Connected Sets, Compact Sets	79
D.	Subspace Topology, Countable Bases	82
E.	Manifolds	86
F.	Exercises	89
Chapter 7	<u>Maximal Tori</u>	92
A.	Cartesian Products of Groups	92
B.	Maximal Tori in Groups	95
C.	Centers Again	100
D.	Exercises	104

Chapter 8	<u>Covering by Maximal Tori</u>	106
A.	General Remarks	106
B.	(+) for $U(n)$ and $SU(n)$	108
C.	(+) for $SO(n)$	111
D.	(+) for $Sp(n)$	116
E.	Reflections in \mathbb{R}^n (again)	119
F.	Exercises	122
Chapter 9	<u>Conjugacy of Maximal Tori</u>	124
A.	Monogenic Groups	124
B.	Conjugacy of Maximal Tori	126
C.	The Isomorphism Question Again	127
D.	Simple Groups, Simply-Connected Groups	129
E.	Exercises	132
Chapter 10	$Spin(k)$	133
A.	Clifford Algebras	133
B.	$Pin(k)$ and $Spin(k)$	137
C.	The Isomorphisms	142
D.	Exercises	144
Chapter 11	<u>Normalizers, Weyl Groups</u>	145
A.	Normalizers	145
B.	Weyl Groups	149
C.	$Spin(2n+1)$ and $Sp(n)$	151
D.	$SO(n)$ Splits	156
E.	Exercises	162
Chapter 12	<u>Lie Groups</u>	163
A.	Differentiable Manifolds	163
B.	Tangent Vectors, Vector Fields	164
C.	Lie Groups	172
D.	Connected Groups	177
E.	Abelian Groups	182
Appendix		184
Index		186