

Contents

A	p-Adic Analysis and Lie Groups	1
I	Foundations	3
1	Ultrametric Spaces	3
2	Nonarchimedean Fields	8
3	Convergent Series	14
4	Differentiability	17
5	Power Series	25
6	Locally Analytic Functions	38
II	Manifolds	45
7	Charts and Atlases	45
8	Manifolds	47
9	The Tangent Space	56
10	The Topological Vector Space $C^{\text{an}}(M, E)$, Part 1	74
11	Locally Convex K -Vector Spaces	79
12	The Topological Vector Space $C^{\text{an}}(M, E)$, Part 2	84
III	Lie Groups	89
13	Definitions and Foundations	89
14	The Universal Enveloping Algebra	101

15 The Concept of Free Algebras	106
16 The Campbell-Hausdorff Formula	111
17 The Convergence of the Hausdorff Series	124
18 Formal Group Laws	132
 B The Algebraic Theory of p -Adic Lie Groups	 155
 IV Preliminaries	 157
19 Completed Group Rings	157
20 The Example of the Group $\mathbb{Z}_p^d$	163
21 Continuous Distributions	164
22 Appendix: Pseudocompact Rings	165
 V p -Valued Pro- p -Groups	 169
23 p -Valuations	169
24 The Free Group on Two Generators	175
25 The Operator P	178
26 Finite Rank Pro- p -Groups	181
27 Compact p -Adic Lie Groups	192
 VI Completed Group Rings of p -Valued Groups	 195
28 The Ring Filtration	195
29 Analyticity	201
30 Saturation	208

Contents	xi
VII The Lie Algebra	219
31 A Normed Lie Algebra	219
32 The Hausdorff Series	232
33 Rational p-Valuations and Applications	243
34 Coordinates of the First and of the Second Kind	247
References	251
Index	253