

Contents

Preface	xi
Conventions	xv
I Groups and graphs	1
1 Groups	1
2 Graphs	4
3 Graphs of groups	11
4 Groups acting on trees	15
5 Trees for certain automorphism groups	21
6 The exact sequence for a tree	28
7 The fundamental group and its tree	31
8 Free groups	36
9 Groups acting on connected graphs	39
10 Free products	42
Notes and comments	45
II Cutting graphs and building trees	47
1 Tree sets	47
2 The Boolean ring of a graph	54
3 Distance-transitive graphs	67
Notes and comments	71
III The Almost Stability Theorem	73
1 Motivation	73
2 Digression: the classical approach	74
3 Blowing up	78
4 Notation	80
5 Preliminaries	82
	vii

6	The main argument	83
7	Finitely generated extensions	90
8	The general case	95
	Notes and comments	100
IV	Applications of the Almost Stability Theorem	101
1	Subgroups of finite index	101
2	Derivations to projective modules	107
3	Cohomological dimension one	110
4	Projective augmentation modules	115
5	Splitting augmentation ideals	120
6	Ends of groups	124
7	Accessibility	130
	Notes and comments	133
V	Poincaré duality	135
1	Introduction	135
2	PD-modules	141
3	PD-groups	155
4	Low-dimensional examples	159
5	Subgroups of finite index	170
6	Subgroups of infinite index	173
7	PD-pairs	175
8	Trees and Poincaré duality	183
9	Relative ends	192
10	PD ² -pairs	200
11	Projective modules over group rings	202
12	PD ² -groups	207
	Notes and comments	213
VI	Two-dimensional complexes and three-dimensional manifolds	215
1	Simplicial complexes	215
2	Orbit spaces	220
3	Patterns and tracks	223
4	Almost finitely presented groups	229
5	Addition of patterns	233
6	The accessibility of almost finitely presented groups	242
7	Two-manifolds	243
8	Patterns and surfaces in three-manifolds	246

9	Simplifying surface maps	249
10	The equivariant sphere and loop theorems	255
11	The Loop Theorem	263
12	The Sphere Theorem	268
	Notes and comments	271
	Bibliography and author index	272
	Symbol index	276
	Subject index	279