

# Contents

<b>1</b>	<b>Introduction .....</b>	<b>1</b>
<b>2</b>	<b>Three-Dimensional Point Groups .....</b>	<b>9</b>
2.1	Preliminaries .....	9
2.2	Classification of Orientation-Preserving Point Groups .....	11
2.3	Classification of Point Groups with Central Inversion .....	15
2.4	Classification of the Remaining Point Groups and Summary .....	15
2.5	Descriptions of Selected Point Groups .....	17
2.5.1	The Orientation-Preserving Standard Point Groups .....	17
2.5.2	The Standard Point Groups with Inversion.....	18
2.5.3	The Remaining Standard Point Groups .....	18
2.5.4	Some Non-standard Point Groups .....	20
<b>3</b>	<b>Arithmetic Classification of Pairs <math>(L, H)</math> .....</b>	<b>23</b>
3.1	Definition of Arithmetic Equivalence and a Lemma.....	23
3.2	Full Sublattices in Pairs $(L, H)$ , Where $H$ Contains $(-1)$ .....	24
3.3	Description of Possible Lattices $L$ .....	28
3.4	Classification of Pairs $(L, H)$ , Where $(-1) \in H$ .....	32
3.5	The Classification of the Remaining Pairs $(L, H)$ .....	36
<b>4</b>	<b>The Split Three-Dimensional Crystallographic Groups .....</b>	<b>41</b>
<b>5</b>	<b>A Splitting Formula for Lower Algebraic <math>K</math>-Theory .....</b>	<b>45</b>
5.1	A Construction of $E_{FIN}(\Gamma)$ for Crystallographic Groups .....	45
5.2	A Construction of $E_{VC}(\Gamma)$ for Crystallographic Groups.....	45
5.3	A Splitting Formula for the Lower Algebraic $K$ -Theory .....	47
<b>6</b>	<b>Fundamental Domains for the Maximal Groups.....</b>	<b>59</b>
6.1	A Special Case of Poincare's Fundamental Polyhedron Theorem .....	59
6.2	Cell Structures and Stabilizers .....	62
6.2.1	Standard Cellulations and Equivariant Cell Structures .....	62
6.2.2	Computation of Cell Stabilizers and Negligible Groups ....	64

6.3	A Fundamental Polyhedron for $\Gamma_1$	64
6.4	A Fundamental Polyhedron for $\Gamma_2$	66
6.5	A Fundamental Polyhedron for $\Gamma_3$	69
6.6	A Fundamental Polyhedron for $\Gamma_4$	71
6.7	A Fundamental Polyhedron for $\Gamma_5$	73
6.8	A Fundamental Polyhedron for $\Gamma_6$	75
6.9	A Fundamental Polyhedron for $\Gamma_7$	77
7	<b>The Homology Groups <math>H_n^{\Gamma}(E_{FIN}(\Gamma); \mathbb{K}\mathbb{Z}^{-\infty})</math></b>	81
7.1	The Algebraic $K$ -Theory of Cell Stabilizers in $E_{FIN}(\Gamma)$	82
7.1.1	The Lower Algebraic $K$ -Theory of $\mathbb{Z}/4 \times \mathbb{Z}/2$	83
7.1.2	The Lower Algebraic $K$ -Theory of $\mathbb{Z}/6 \times \mathbb{Z}/2$	84
7.1.3	The Lower Algebraic $K$ -Theory of $A_4 \times \mathbb{Z}/2$	87
7.2	The Homology of $E_{FIN}(\Gamma)$	88
7.3	Calculations of $H_n^{\Gamma}(E_{FIN}(\Gamma); \mathbb{K}\mathbb{Z}^{-\infty})$	90
8	<b>Fundamental Domains for Actions on Spaces of Planes</b>	99
8.1	Negligible Line Stabilizer Groups	99
8.2	The Finiteness of the Indexing Set $\mathcal{T}''$	102
9	<b>Cokernels of the Relative Assembly Maps for <math>VC_{\infty}</math></b>	119
9.1	Passing to Subgroups	119
9.2	Reconstructing $\Gamma_{\ell}$ from $\overline{\Gamma}_{\ell}$	124
9.3	Cokernels of Relative Assembly Maps	131
9.3.1	The Lower Algebraic $K$ -Theory of $C_4 \times \mathbb{Z}$ , $D_4 \times \mathbb{Z}$ , and $D_6 \times \mathbb{Z}$	131
9.3.2	The Lower Algebraic $K$ -Theory of $D_2 \rtimes_{\alpha} \mathbb{Z}$	134
9.3.3	The Lower Algebraic $K$ -Theory of $D_4 *_{C_4} D_4$	135
9.3.4	The Lower Algebraic $K$ -Theory of $C_4 \times D_{\infty}$	135
9.3.5	The Lower Algebraic $K$ -Theory of $D_6 \times D_{\infty}$	136
10	<b>Summary</b>	137
	<b>References</b>	143
	<b>Index</b>	147