

Contents

Preface	vii
Chapter 1 <i>Introduction</i>	
1. Euler's theorem	1
2. Topological equivalence	4
3. Surfaces	8
4. Abstract spaces	12
5. A classification theorem	16
6. Topological invariants	19
Chapter 2 <i>Continuity</i>	
1. Open and closed sets	27
2. Continuous functions	32
3. A space-filling curve	36
4. The Tietze extension theorem	38
Chapter 3 <i>Compactness and connectedness</i>	
1. Closed bounded subsets of \mathbb{E}^n	43
2. The Heine–Borel theorem	44
3. Properties of compact spaces	47
4. Product spaces	51
5. Connectedness	56
6. Joining points by paths	61
Chapter 4 <i>Identification spaces</i>	
1. Constructing a Möbius strip	65
2. The identification topology	66
3. Topological groups	73
4. Orbit spaces	78
Chapter 5 <i>The fundamental group</i>	
1. Homotopic maps	87
2. Construction of the fundamental group	92
3. Calculations	96
4. Homotopy type	103
5. The Brouwer fixed-point theorem	110
6. Separation of the plane	112
7. The boundary of a surface	115

CONTENTS

Chapter 6 *Triangulations*

1. Triangulating spaces	119
2. Barycentric subdivision	125
3. Simplicial approximation	127
4. The edge group of a complex	131
5. Triangulating orbit spaces	140
6. Infinite complexes	143

Chapter 7 *Surfaces*

1. Classification	149
2. Triangulation and orientation	153
3. Euler characteristics	158
4. Surgery	161
5. Surface symbols	165

Chapter 8 *Simplicial homology*

1. Cycles and boundaries	173
2. Homology groups	176
3. Examples	179
4. Simplicial maps	184
5. Stellar subdivision	185
6. Invariance	188

Chapter 9 *Degree and Lefschetz number*

1. Maps of spheres	195
2. The Euler–Poincaré formula	199
3. The Borsuk–Ulam theorem	202
4. The Lefschetz fixed-point theorem	206
5. Dimension	210

Chapter 10 *Knots and covering spaces*

1. Examples of knots	213
2. The knot group	216
3. Seifert surfaces	223
4. Covering spaces	227
5. The Alexander polynomial	234

Appendix: Generators and relations

241

Bibliography

244

Index

246