



<http://www.springer.com/978-1-85233-782-7>

Essential Topology

Crossley, M.D.

2005, X, 224p. 110 illus., Softcover

ISBN: 978-1-85233-782-7

Contents

1. Introduction	1
2. Continuous Functions	3
2.1 Naïve Continuity	3
2.2 Rigorous Continuity	5
2.3 Open Sets	8
2.4 Continuity by Open Sets	11
3. Topological Spaces	15
3.1 Topological Spaces	15
3.2 More Examples of Topological Spaces	19
3.3 Continuity in the Subspace Topology	28
3.4 Bases	31
Interlude	35
4. Topological Properties	37
4.1 Connectivity	37
4.2 Compactness	43
4.3 The Hausdorff Property	50
5. Deconstructionist Topology	55
5.1 Homeomorphisms	55
5.2 Disjoint Unions	66
5.3 Product Spaces	71
5.4 Quotient Spaces	76

Interlude	89
6. Homotopy	91
6.1 Homotopy	91
6.2 Homotopy Equivalence	96
6.3 The Circle	102
6.4 Brouwer's Fixed-Point Theorem	110
6.5 Vector Fields	112
7. The Euler Number	117
7.1 Simplicial Complexes	117
7.2 The Euler Number	121
7.3 The Euler Characteristic and Surfaces	124
8. Homotopy Groups	127
8.1 Homotopy Groups	128
8.2 Induced Homomorphisms	136
8.3 The Fundamental Group	140
8.4 Path Connectivity and π_0	141
8.5 The Van Kampen Theorem	144
9. Simplicial Homology	149
9.1 Simplicial Homology Modulo 2	150
9.2 Limitations of Homology Modulo 2	158
9.3 Integral Simplicial Homology	160
10. Singular Homology	167
10.1 Singular Homology	167
10.2 Homology and Continuous Maps	173
10.3 Homology Respects Homotopies	175
10.4 Barycentric Subdivision	180
10.5 The Mayer–Vietoris Sequence	185
10.6 Homology and Homotopy Groups	193
10.7 Comparison of Singular and Simplicial Homology	194
11. More Deconstructionism	197
11.1 Wedge Products	197
11.2 Suspensions and Loop Spaces	199
11.3 Fibre Bundles	204
11.4 Vector Bundles	209
Solutions to Selected Exercises	213

Bibliography 217

Index 219