

Contents

1	First Steps in Topology	1
	<i>Werner Ballmann</i>	
1.1	Topological Spaces	1
1.2	Continuous Maps	5
1.3	Convergence and Hausdorff Spaces	7
1.4	New from Old	8
1.5	Connectedness and Path-Connectedness	10
1.6	Compact Spaces	14
1.7	The Jordan Curve Theorem	18
1.8	Supplementary Literature	22
1.9	Exercises	22
2	Manifolds	27
	<i>Werner Ballmann</i>	
2.1	Manifolds and Smooth Maps	27
2.2	Tangent Vectors and Derivatives	40
2.3	Submanifolds	49
2.4	Tangent Bundles and Vector Fields	54
2.5	Vector Bundles and Sections	59
2.6	Supplementary Literature	63
2.7	Exercises	63
3	Differential Forms and Cohomology	69
	<i>Werner Ballmann</i>	
3.1	Pfaffian Forms	69
3.2	Differential Forms	72
3.3	De Rham Cohomology	76
3.4	The Poincaré Lemma	78
3.5	The Mayer-Vietoris Sequence and the Brouwer Fixed-Point Theorem	82
3.6	Orientations and the Jordan-Brouwer Theorem	86
3.7	The Oriented Integral and Stokes's Integral Formula	91
3.8	Supplementary Literature	97
3.9	Exercises	97
4	The Geometry of Submanifolds	103
	<i>Werner Ballmann</i>	
4.1	Curves	104
4.2	Interior Geometry	115
4.3	Exterior Geometry	130
4.4	Gauß Equations and the Theorema Egregium	141

4.5	Supplementary Literature	147
4.6	Exercises	148

A	Alternating Multilinear Forms	153
	Werner Ballmann	
B	Cochain Complexes	159
	Werner Ballmann	
	Bibliography	163
	Index	165