

Contents

	<i>Preface</i>	page vii
	<i>Notation</i>	xi
1	Euclidean geometry	1
	1.1 The axiomatic approach	1
	1.2 The Cartesian model	13
2	Curve theory	22
	2.1 Curves in \mathbb{R}^n	22
	2.2 Plane curves	34
	2.3 Space curves	57
3	Classical surface theory	81
	3.1 Regular surfaces	81
	3.2 The tangent plane	93
	3.3 The first fundamental form	98
	3.4 Normal fields and orientability	103
	3.5 The second fundamental form	106
	3.6 Curvature	110
	3.7 Surface area and integration on surfaces	126
	3.8 Some classes of surfaces	132
4	The inner geometry of surfaces	149
	4.1 Isometries	149
	4.2 Vector fields and the covariant derivative	152
	4.3 Riemann curvature tensor and <i>Theorema Egregium</i>	160
	4.4 Riemannian metrics	168
	4.5 Geodesics	171
	4.6 The exponential map	183
	4.7 Parallel transport	192
	4.8 Jacobi fields	196

vi	CONTENTS	
	4.9 Spherical and hyperbolic geometry	201
	4.10 Cartography	210
	4.11 Further models of hyperbolic geometry	217
5	Geometry and analysis	223
	5.1 The divergence theorem	223
	5.2 Variation of the metric	233
6	Geometry and topology	239
	6.1 Polyhedra	239
	6.2 Triangulations	242
	6.3 The Gauss–Bonnet theorem	259
	6.4 Outlook	262
	Appendix A Hints for solutions to (most) exercises	266
	Appendix B Formulary	305
	Appendix C List of symbols	309
	<i>References</i>	311
	<i>Index</i>	313

The plates are to be found between pages 148 and 149