Contents

Editorial note V

Preface VII

CHAPTER 1. **Differentiable functions in R^n** 1
§ 1.1 Taylor's formula 2
§ 1.2 Partitions of unity 11
§ 1.3 Inverse functions, implicit functions and the rank theorem 13
§ 1.4 Sard's theorem and functional dependence 19
§ 1.5 Borel's theorem on Taylor series 28
§ 1.6 Whitney's approximation theorem 31
§ 1.7 An approximation theorem for holomorphic functions 38
§ 1.8 Ordinary differential equations 43

CHAPTER 2. **Manifolds** 52
§ 2.1 Basic definitions 52
§ 2.2 The tangent and cotangent bundles 60
§ 2.3 Grassmann manifolds 66
§ 2.4 Vector fields and differential forms 69
§ 2.5 Submanifolds 80
§ 2.6 Exterior differentiation 86
§ 2.7 Orientation 94
§ 2.8 Manifolds with boundary 96
§ 2.9 Integration 100

§ 2.10 One parameter groups 106
§ 2.11 The Frobenius theorem. 112
§ 2.12 Almost complex manifolds 122
§ 2.13 The lemmata of Poincaré and Grothendieck. . . . 128
§ 2.14 Applications: Hartogs' continuation theorem and the Oka-Weil theorem 134
§ 2.15 Immersions and imbeddings: Whitney's theorems . 141
§ 2.16 Thom's transversality theorem. 150

CHAPTER 3. **Linear elliptic differential operators**. 155
§ 3.1 Vector bundles 155
§ 3.2 Fourier transforms. 164
§ 3.3 Linear differential operators. 171
§ 3.4 The Sobolev spaces. 184
§ 3.5 The lemmata of Rellich and Sobolev 191
§ 3.6 The inequalities of Garding and Friedrichs 200
§ 3.7 Elliptic operators with C^∞ coefficients: the regularity theorem 211
§ 3.8 Elliptic operators with analytic coefficients 218
§ 3.9 The finiteness theorem 226
§ 3.10 The approximation theorem and its application to open Riemann surfaces. 234

References 242

Subject index 245