

Contents

Preface — V

1 Usco mappings — 1

- 1.1 Introduction — 2
- 1.1.1 Basic properties — 2
- 1.1.2 Examples — 7
- 1.1.3 Construction of usco mappings — 9
- 1.2 The Kakutani–Glicksberg–Fan fixed-point theorem — 11
- 1.3 Minimal usco mappings — 18
- 1.4 Selection theorems — 25
- 1.4.1 Michael’s selection theorem — 25
- 1.4.2 Jayne–Rogers’ selection theorem — 32
- 1.5 Metric-valued mappings — 45
- 1.5.1 Metric-valued usco mappings — 45
- 1.5.2 Fort’s Theorem — 49
- 1.6 Exercises and commentary — 54

2 Quasicontinuity — 59

- 2.1 Introduction — 59
- 2.2 Quasicontinuous functions — 59
- 2.3 The set of points of continuity of a quasicontinuous function — 68
- 2.4 Quasicontinuity and measurability — 79
- 2.5 Limits of quasicontinuous functions — 86
- 2.6 Applications of quasicontinuity — 92
- 2.7 Ascoli-type theorem for quasicontinuous functions — 109
- 2.8 Metrisability of quasicontinuous functions — 123

3 Applications of usco mappings — 129

- 3.1 Usco mappings in topology — 129
- 3.1.1 Extensions of usco mappings — 129
- 3.1.2 Spaces with a G_δ -diagonal — 131
- 3.1.3 Extensions of continuous functions — 131
- 3.1.4 Extensions of functions on compact sets — 133
- 3.1.5 \mathcal{K} -countably determined spaces — 134
- 3.2 Usco mappings in approximation theory — 137
- 3.2.1 Nearest points — 137
- 3.2.2 Farthest points — 145
- 3.3 Differentiability of convex functions — 148
- 3.3.1 Gâteaux differentiability of convex functions — 155
- 3.3.2 Fréchet differentiability of convex functions — 163

3.4	Variational analysis — 174
3.5	James' weak compactness theorem — 189
3.6	Differentiability of Lipschitz functions — 195
3.7	Exercises and commentary — 215
4	Topological properties of the space of usco mappings — 221
4.1	Minimal usco mappings — 221
4.2	Densely continuous forms — 226
4.3	Minimal cusco mappings — 229
4.4	Minimal cusco mappings and extreme functions — 233
4.5	Minimal usco and minimal cusco mappings — 235
4.6	Topological properties — 237
4.7	Metrisation of τ_{UC} — 244
4.8	Ascoli theorem for minimal usco and minimal cusco mappings — 251
4.9	Hausdorff metric on the space of usco mappings — 255
4.10	Applications — 257
4.11	Topological properties of the space of minimal cusco mappings — 261
4.12	Countability properties of $C(X, \mathbb{R})$ — 263
4.13	Relationship of $C(X, \mathbb{R})$ and $MC(X, \mathbb{R})$ — 264
4.14	Countability and completeness-like properties of cusco mappings — 268
	Bibliography — 275
	Index of notation and conventions — 287
	Index — 291