

Contents

0. Preliminaries.....	1
0.1. Sets and Functions.....	1
0.2. Relations	4
0.3. The Real Number System	4
0.4. Sequences of Real Numbers	6
0.5. Limits of Functions and Continuous Functions.....	8
0.6. Sequences of Functions.....	9
0.7. Compact Sets	10
0.8. Derivative and Riemann Integral.....	11
0.9. Cantor's Construction	13
0.10. Addition, Multiplication and Order in \mathbb{R}	17
0.11. Completeness of \mathbb{R}	19
1. Basic Concepts.....	23
1.1. Inequalities	23
1.2. Metric Spaces.....	27
1.3. Sequences in Metric Spaces.....	37
1.4. Cauchy Sequences	44
1.5. Completion of a Metric Space	54
1.6. Exercises.....	58
2. Topology of a Metric Space	64
2.1. Open and Closed Sets.....	64
2.2. Relativisation and Subspaces	78
2.3. Countability Axioms and Separability	82
2.4. Baire's Category Theorem.....	88
2.5. Exercises.....	98

3. Continuity	103
3.1. Continuous Mappings	103
3.2. Extension Theorems.....	109
3.3. Real and Complex-valued Continuous Functions.....	112
3.4. Uniform Continuity	114
3.5. Homeomorphism, Equivalent Metrics and Isometry	119
3.6. Uniform Convergence of Sequences of Functions.....	123
3.7. Contraction Mappings and Applications.....	132
3.8. Exercises.....	143
4. Connected Spaces	156
4.1. Connectedness	156
4.2. Local Connectedness	163
4.3. Arcwise Connectedness	165
4.4. Exercises.....	167
5. Compact Spaces	170
5.1. Bounded sets and Compactness	171
5.2. Other Characterisations of Compactness.....	178
5.3. Continuous Functions on Compact Spaces.....	182
5.4. Locally Compact Spaces.....	185
5.5. Compact Sets in Special Metric Spaces	188
5.6. Exercises.....	194
6. Product Spaces	201
6.1. Finite and Infinite Products of Sets.....	201
6.2. Finite Metric Products	202
6.3. Infinite Metric Products.....	208
6.4. Cantor Set	212
6.5. Exercises.....	215
Index.....	219



<http://www.springer.com/978-1-85233-922-7>

Metric Spaces

Shirali, S.; Vasudeva, H.L.

2006, VIII, 222 p. 21 illus., Softcover

ISBN: 978-1-85233-922-7