

Contents

| | | |
|----------|-----------------------------------------------------|-----|
| 1 | Introduction | 1 |
| 1.1 | Lifting to Relational Style | 1 |
| 1.2 | Equational vs. Implicational Style | 3 |
| 1.3 | Chapter Organization | 4 |
| 1.4 | Final Remarks | 6 |
| 2 | Prerequisites | 7 |
| 2.1 | Preliminaries | 7 |
| 2.2 | Power Operations | 14 |
| 3 | Products of Relations | 25 |
| 3.1 | Products of Sets and Relations | 25 |
| 3.2 | Sharp Factorizations | 31 |
| 3.3 | Binary Mappings in General | 37 |
| 4 | Meet and Join as Relations | 45 |
| 4.1 | Cone Mappings | 45 |
| 4.2 | Binary and Arbitrary Meets and Joins | 48 |
| 4.3 | Join and Meet in a Powerset | 54 |
| 4.4 | Boolean Algebra Using Lifted Operations | 65 |
| 5 | Applying Relations in Topology | 67 |
| 5.1 | General Properties of Kernel Forming | 68 |
| 5.2 | Topology Via Neighborhoods and Kernel Forming | 72 |
| 5.3 | Qualifying a Topology Via Its Open Sets | 77 |
| 5.4 | Interior and Closure | 90 |
| 5.5 | Separation | 91 |
| 5.6 | Continuity | 93 |
| 6 | Construction of Topologies | 99 |
| 6.1 | Quotient Topology | 99 |
| 6.2 | Relative Topology | 102 |
| 6.3 | Product Topology | 104 |

| | | |
|-----------|-------------------------------------------------|-----|
| 7 | Closures and Their Aumann Contacts | 113 |
| 7.1 | Aumann Contact Related to Topology | 113 |
| 7.2 | Overview of Relationships | 121 |
| 8 | Proximity and Nearness | 125 |
| 8.1 | Proximity | 125 |
| 8.2 | Another Proximity Concept..... | 129 |
| 8.3 | Nearness | 135 |
| 8.4 | Apartness and Connection Algebra..... | 138 |
| 9 | Frames | 145 |
| 9.1 | From a Topology to a Frame..... | 145 |
| 9.2 | From a Frame to a Topology..... | 150 |
| 10 | Simplicial Complexes | 155 |
| 10.1 | Simplices | 155 |
| 10.2 | Orientation..... | 156 |
| 10.3 | Simplicial Complexes | 162 |
| 10.4 | Orientability of a Simplicial Complex | 167 |
| | Concluding Remarks | 183 |
| | References | 185 |
| | Index | 189 |