Contents

Preface v

Chapter 1
INTRODUCTION
1.1. The scope of the work 1
1.2. Digraphs and graphs 3
1.3. Reaching and joining 4
1.4. Connectedness 5

Chapter 2
THE ONE-WAY STREET PROBLEM
2.1. Robbins' theorem 7
2.2. Some streets two-way 8
2.3. Algorithms for one-way street assignments 9
2.4. Efficiency 11
2.5. Inefficiency 13

Chapter 3
INTERSECTION GRAPHS
3.1. Transitive orientations 15
3.2. Intersection graphs 16
3.3. Interval graphs and their applications 17
3.4. Characterization of interval graphs 18
3.5. Circular arc graphs 22
3.6. Phasing traffic lights 22
3.7. The mobile radio frequency assignment problem 25

Chapter-4
INDIFFERENCE, MEASUREMENT, AND SERIATION
4.1. Indifference graphs 27
4.2. Seriation 31
4.3. Trees 34
4.4. Uniqueness 36

Chapter 5
FOOD WEBS, NICHE OVERLAP GRAPHS, AND THE BOXICITY OF ECOLOGICAL PHASE SPACE
5.1. Boxicity 39
5.2. The boxicity of ecological phase space 41
5.3. The properties of niche overlap graphs 43
5.4. Community food webs, sink food webs, and source food webs . . 46

Chapter 6
COLORABILITY
6.1. Applications of graph coloring 49
6.2. Calculating the chromatic number 50

6.3. Clique number 51
6.4. γ-perfect graphs 52
6.5. Multicolorings 53
6.6. Multichromatic number 56

Chapter 7
INDEPENDENCE AND DOMINATION
7.1. The normal product 57
7.2. The capacity of a noisy channel 57
7.3. Dominating sets 62
7.4. Stable sets 63

Chapter 8
APPLICATIONS OF EULERIAN CHAINS AND PATHS
8.1. Existence theorems 65
8.2. The transportation problem 66
8.3. Street sweeping 67
8.4. RNA chains 70
8.5. More on eulerian closed paths, DNA, and coding 73
8.6. Telecommunications 75

Chapter 9
BALANCE THEORY AND SOCIAL INEQUALITIES
9.1. The theory of balance 79
9.2. Balance in signed digraphs 81
9.3. Degree of balance 82
9.4. Distributive justice 83
9.5. Status organizing processes and social inequalities 86
9.6. Strengths of likes and dislikes 86

Chapter 10
PULSE PROCESSES AND THEIR APPLICATIONS
10.1. Structural modeling 89
10.2. Energy and food 90
10.3. Pulse processes 93
10.4. Structure and stability 95
10.5. Integer weights 98
10.6. Stability and signs 99

Chapter 11
QUALITATIVE MATRICES
11.1. Sign solvability 101
11.2. Sign stability 103
11.3. GM matrices 105

References 109
Index 116