

Contents

<i>Notation</i>		xi
Chapter 1	What Is Enumerative Combinatorics?	1
1.1	How to Count	1
1.2	Sets and Multisets	13
1.3	Permutation Statistics	17
1.4	The Twelffold Way	31
	Notes	40
	References	42
	A Note about the Exercises	42
	Exercises	43
	Solutions to Exercises	51
Chapter 2	Sieve Methods	64
2.1	Inclusion–Exclusion	64
2.2	Examples and Special Cases	67
2.3	Permutations with Restricted Positions	71
2.4	Ferrers Boards	74
2.5	V -partitions and Unimodal Sequences	76
2.6	Involutions	79
2.7	Determinants	82
	Notes	85
	References	85
	Exercises	86
	Solutions to Exercises	90
		ix

x Contents

<i>Chapter 3</i>	Partially Ordered Sets	96
3.1	Basic Concepts	96
3.2	New Posets from Old	100
3.3	Lattices	102
3.4	Distributive Lattices	105
3.5	Chains in Distributive Lattices	110
3.6	The Incidence Algebra of a Locally Finite Poset	113
3.7	The Möbius Inversion Formula	116
3.8	Techniques for Computing Möbius Functions	117
3.9	Lattices and Their Möbius Algebras	124
3.10	The Möbius Function of a Semimodular Lattice	126
3.11	Zeta Polynomials	129
3.12	Rank-selection	131
3.13	R-labelings	133
3.14	Eulerian Posets	135
3.15	Binomial Posets and Generating Functions	140
3.16	An Application to Permutation Enumeration	147
	Notes	149
	References	152
	Exercises	153
	Solutions to Exercises	174
<i>Chapter 4</i>	Rational Generating Functions	202
4.1	Rational Power Series in One Variable	202
4.2	Further Ramifications	204
4.3	Polynomials	208
4.4	Quasi-polynomials	210
4.5	P -partitions	211
4.6	Linear Homogeneous Diophantine Equations	221
4.7	The Transfer-matrix Method	241
	Notes	260
	References	263
	Exercises	264
	Solutions to Exercises	275
<i>Appendix</i>	Graph Theory Terminology	293
<i>Index</i>		296
	<i>Supplementary Problems</i>	307
	<i>Errata and Addenda</i>	319