

Contents

<i>List of contributors</i>	<i>page</i> ix
<i>Preface</i>	xi
<i>Acknowledgments</i>	xix
1 Preliminaries	1
V. BERTHÉ, M. RIGO	
1.1 Conventions	1
1.2 Words	1
1.3 Morphisms	4
1.4 Languages and machines	5
1.5 Symbolic dynamics	10
2 Expansions in non-integer bases	18
M. DE VRIES, V. KOMORNIK	
2.1 Introduction	18
2.2 Greedy and lazy expansions	19
2.3 On the cardinality of the sets $\mathcal{E}_\beta(x)$	22
2.4 The random map K_β and infinite Bernoulli convolutions	26
2.5 Lexicographic characterisations	35
2.6 Univoque bases	39
2.7 Univoque sets	50
2.8 A two-dimensional univoque set	55
2.9 Final remarks	56
2.10 Exercises	57
3 Medieties, end-first algorithms, and the case of Rosen continued fractions	59
B. RITTAUD	
3.1 Introduction	59
3.2 Generalities	62
3.3 Examples	68

Cambridge University Press

978-1-107-07702-7 - Combinatorics, Words and Symbolic Dynamics

Edited by Valérie Berthé and Michel Rigo

Table of Contents

[More information](#)

vi

Contents

3.4	End-first algorithms	76
3.5	Medieties with k letters	82
3.6	An end-first algorithm for k -medieties	89
3.7	Exercises	92
3.8	Open problems	100
4	Repetitions in words	101
	N. RAMPERSAD, J. SHALLIT	
4.1	Introduction	101
4.2	Avoidability	102
4.3	Dejean's theorem	114
4.4	Avoiding repetitions in arithmetic progressions	120
4.5	Patterns	123
4.6	Abelian repetitions	123
4.7	Enumeration	134
4.8	Decidability for automatic sequences	143
4.9	Exercises	145
4.10	Notes	146
5	Text redundancies	151
	G. BADKOBEB, M. CROCHEMORE, C. S. ILIOPOULOS, M. KUBICA	
5.1	Redundancy: a versatile notion	151
5.2	Avoiding repetitions and repeats	153
5.3	Finding repetitions and runs	157
5.4	Finding repeats	163
5.5	Finding covers and seeds	167
5.6	Palindromes	171
6	Similarity relations on words	175
	V. HALAVA, T. HARJU, T. KÄRKI	
6.1	Introduction	175
6.2	Preliminaries	176
6.3	Coding	181
6.4	Relational periods	186
6.5	Repetitions in relational words	204
6.6	Exercises and problems	211
7	Synchronised automata	213
	M.-P. BÉAL, D. PERRIN	
7.1	Introduction	213
7.2	Definitions	214
7.3	Černý's conjecture	215
7.4	Road colouring	229

Cambridge University Press

978-1-107-07702-7 - Combinatorics, Words and Symbolic Dynamics

Edited by Valérie Berthé and Michel Rigo

Table of Contents

[More information](#)

<i>Contents</i>		vii
8 Cellular automata, tilings and (un)computability		241
J. KARI		
8.1 Cellular automata		242
8.2 Tilings and undecidability		260
8.3 Undecidability concerning cellular automata		279
8.4 Conclusion		293
8.5 Exercises		293
9 Multidimensional shifts of finite type and sofic shifts		296
M. HOCHMAN		
9.1 Introduction		296
9.2 Shifts of finite type and sofic shifts		297
9.3 Basic constructions and undecidability		305
9.4 Degrees of computability		317
9.5 Slices and subdynamics of sofic shifts		326
9.6 Frequencies, word growth and periodic points		342
10 Linearly recursive sequences and Dynkin diagrams		359
C. REUTENAUER		
10.1 Introduction		359
10.2 SL_2 -tilings of the plane		360
10.3 SL_2 -tiling associated with a bi-infinite discrete path		361
10.4 Proof of Theorem 10.3.1		363
10.5 \mathbb{N} -rational sequences		365
10.6 \mathbb{N} -rationality of the rays in SL_2 -tilings		369
10.7 Friezes		370
10.8 Dynkin diagrams		377
10.9 Rational frieze implies Dynkin diagram		382
10.10 Rationality for Dynkin diagrams of type \mathbb{A} and $\tilde{\mathbb{A}}$		385
10.11 Further properties of SL_2 -tilings		387
10.12 The other extended Dynkin diagrams		397
10.13 Problems and conjectures		397
10.14 Exercises		398
11 Pseudo-randomness of a random Kronecker sequence. An instance of dynamical analysis		401
E. CESARATTO, B. VALLÉE		
11.1 Introduction		401
11.2 Five parameters for Kronecker sequences		404
11.3 Probabilistic models		415
11.4 Statements of the main results		417

Cambridge University Press

978-1-107-07702-7 - Combinatorics, Words and Symbolic Dynamics

Edited by Valérie Berthé and Michel Rigo

Table of Contents

[More information](#)

viii

Contents

11.5	Dynamical analysis	423
11.6	Balanced costs	430
11.7	Unbalanced costs	436
11.8	Summary of functional analysis	438
11.9	Conclusion and open problems	441
	<i>Bibliography</i>	443
	<i>Notation index</i>	464
	<i>General index</i>	466