

## Contents

---

<i>Preface</i>	<i>page xi</i>
<i>Acknowledgments</i>	xiv
<i>Glossary of Frequently Used Notation</i>	xv
<i>History and Summary</i>	xix
<b>1 Ineffective Results for Diophantine Equations over Finitely Generated Domains</b>	<b>1</b>
1.1 Thue Equations	2
1.2 Unit Equations in Two Unknowns	5
1.3 Hyper- and Superelliptic Equations	7
1.4 Curves with Finitely Many Integral Points	8
1.5 Decomposable Form Equations and Multivariate Unit Equations	9
1.6 Discriminant Equations for Polynomials and Integral Elements	13
<b>2 Effective Results for Diophantine Equations over Finitely Generated Domains: The Statements</b>	<b>18</b>
2.1 Notation and Preliminaries	18
2.2 Unit Equations in Two Unknowns	21
2.3 Thue Equations	24
2.4 Hyper- and Superelliptic Equations, the Schinzel–Tijdeman Equation	24
2.5 The Catalan Equation	25
2.6 Decomposable Form Equations	26
2.7 Norm Form Equations	31
2.8 Discriminant Form Equations and Discriminant Equations	32
2.9 Open Problems	36

<b>3</b>	<b>A Brief Explanation of Our Effective Methods over Finitely Generated Domains</b>	39
3.1	Sketch of the Effective Specialization Method	39
3.2	Illustration of the Application of the Effective Specialization Method to Diophantine Equations	45
3.3	Sketch of the Method Reducing Equations to Unit Equations	46
3.3.1	Effective Finiteness Result for Systems of Unit Equations	47
3.3.2	Reduction of Decomposable Form Equations to Unit Equations	49
3.3.3	Quantitative Versions	50
3.3.4	Reduction of Discriminant Equations to Unit Equations	52
3.4	Comparison of Our Two Effective Methods	54
<b>4</b>	<b>Effective Results over Number Fields</b>	55
4.1	Notation and Preliminaries	56
4.2	Effective Estimates for Linear Forms in Logarithms	64
4.3	$S$ -Unit Equations	67
4.4	Thue Equations	71
4.5	Hyper- and Superelliptic Equations, the Schinzel–Tijdeman Equation	73
4.6	The Catalan Equation	81
4.7	Decomposable Form Equations	89
4.8	Discriminant Equations	94
<b>5</b>	<b>Effective Results over Function Fields</b>	98
5.1	Notation and Preliminaries	98
5.2	$S$ -Unit Equations	102
5.3	The Catalan Equation	104
5.4	Thue Equations	105
5.5	Hyper- and Superelliptic Equations	108
<b>6</b>	<b>Tools from Effective Commutative Algebra</b>	114
6.1	Effective Linear Algebra over Polynomial Rings	115
6.2	Finitely Generated Fields over $\mathbb{Q}$	119
6.3	Finitely Generated Integral Domains over $\mathbb{Z}$	122
<b>7</b>	<b>The Effective Specialization Method</b>	128
7.1	Notation	128
7.2	Construction of a More Convenient Ground Domain $B$	129
7.3	Comparison of Different Degrees and Heights	136

*Contents*

ix

7.4	Specializations	140
7.5	Multiplicative Independence	150
<b>8</b>	<b>Degree-Height Estimates</b>	156
8.1	Definitions	156
8.2	Estimates for Factors of Polynomials	158
8.3	Consequences	162
<b>9</b>	<b>Proofs of the Results from Sections 2.2 to 2.5</b>	
	<b>Use of Specializations</b>	171
9.1	A Reduction	172
9.1.1	Unit Equations	173
9.1.2	Thue Equations	175
9.1.3	Hyper- and Superelliptic Equations	176
9.2	Bounding the Degrees	177
9.2.1	Unit Equations	178
9.2.2	Thue Equations	179
9.2.3	Hyper- and Superelliptic Equations	180
9.3	Bounding the Heights and Specializations	181
9.3.1	Unit Equations	182
9.3.2	Thue Equations	184
9.3.3	Hyper- and Superelliptic Equations	188
9.4	The Catalan Equation	190
<b>10</b>	<b>Proofs of the Results from Sections 2.6 to 2.8</b>	
	<b>Reduction to Unit Equations</b>	194
10.1	Proofs of the Central Results on Decomposable Form Equations	194
10.2	Proofs of the Results for Norm Form Equations	201
10.3	Proofs of the Results for Discriminant Form Equations and Discriminant Equations	202
	<i>References</i>	206
	<i>Index</i>	214