

Graduate Texts in Mathematics

David M. Goldschmidt

Algebraic Functions and Projective Curves



Springer

Contents

Preface	vii
Introduction	xi
1 Background	1
1.1 Valuations	1
1.2 Completions	16
1.3 Differential Forms	24
1.4 Residues	30
1.5 Exercises	37
2 Function Fields	40
2.1 Divisors and Adeles	40
2.2 Weil Differentials	47
2.3 Elliptic Functions	52
2.4 Geometric Function Fields	54
2.5 Residues and Duality	58
2.6 Exercises	64
3 Finite Extensions	68
3.1 Norm and Conorm	69
3.2 Scalar Extensions	72
3.3 The Different	75
3.4 Singular Prime Divisors	82
3.5 Galois Extensions	89
3.6 Hyperelliptic Functions	93

x Contents

3.7	Exercises	99
4	Projective Curves	103
4.1	Projective Varieties	103
4.2	Maps to $\mathbb{P}^n$	108
4.3	Projective Embeddings	114
4.4	Weierstrass Points	122
4.5	Plane Curves	136
4.6	Exercises	147
5	Zeta Functions	150
5.1	The Euler Product	151
5.2	The Functional Equation	154
5.3	The Riemann Hypothesis	156
5.4	Exercises	161
A	Elementary Field Theory	164
	References	175
	Index	177