Table of Contents

	Page
Preface	
Chapter I: Review of basic concepts	1
1.1 Coverings	1
1.2 Function Fields	2
1.3 Plane Curves	3
1.4 Divisors on Riemann surfaces	5
1.5 Linear series	7
1.6 Line bundles	10
Chapter 2: Some exceptional points on Riemann surfaces	13
2.6 (Theorem on the sum of generalized Weierstrass weights)	17
2.7 Examples	18
2.8 Theorem (on the maximum weight of a generalized Weierstrass point)	18
Chapter 3: The inequality of Castelnuovo-Severi	20
3.5 Statement of the inequality of Castelnuovo-Severi	21
3.6 Applications	22
3.7 Some Remarks	22
3.8 Proof of Theorem 3.5	23
3.9 Castelnuovo's Riemann-Roch theorem	27
3.10 An application of Castelnuovo's Riemann-Roch theorem	29

Chapter 4: Smooth and branched coverings of Riemann surfaces 30

4.1 (Some standard results) 30
4.2 Classification of smooth coverings 30
4.3 Lifting conformal structures 31
4.4 Cover transformations 31
4.5 Some remarks on permutation groups 33
4.6 (Galois coverings) 33
4.7 (The monodromy group) 34
4.8 (Existence theorem) 36
4.9 Galois closure 36
4.10 Branched coverings 36
4.11 (Lifting automorphisms) 39
4.13 (Lifting automorphisms to Abelian coverings) 40
4.14 Conjugate automorphisms groups 40
4.15 (Some consequences) 41

Chapter 5: Automorphisms of Riemann surfaces, I 42

5.1 (Theorem of H. A. Schwarz) 42
5.2 (Galois coverings of the Riemann sphere) 42
5.3 Groups of genus zero 43
5.4 Groups of genus one 44
5.5 Maximal automorphism groups for $p \geq 2$ 45
5.6 An infinite number of (3,3,7)'s 46
5.7 Smooth cyclic coverings of prime order 48
5.8 $N(p) < 84(p - 1)$ infinitely often 48
5.9 Groups with partitions 48
5.10 $Z_2 \times Z_2$ 49
5.11 $Z_2 \times Z_2 \times Z_2$ 50
5.12 Dihedral groups of automorphisms 50
5.13 Commuting involutions 51

Chapter 6: When are fixed points of automorphisms exceptional in some other sense? 52

6.1 Lewittes' theorem 52
6.2 G_{168} on X_3 52
6.3 Cyclic coverings of P^1 of prime order: Examples 54
6.4 (Motivating Lemma) 58
6.6 (Lemma on G-gaps) 59
6.13 (Theorem on higher order Weierstrass points) 62
6.14 Cyclic coverings in general 62
6.16 Invariant divisors 64
6.19 (Theorem on G-weights) 70
6.20 (Automorphisms with three or more fixed points) 71

Chapter 7: Automorphisms of Riemann surfaces, II; N(p) 74

7.2 For $p \geq 2$, $N(p) \geq 8(p+1)$ 74
7.3 If 3 divides p, then $N(p) \geq 8(p+3)$ 74
7.4 (Z_2 Lower bounds for some N(p)'s) 75
7.5 (Statement of Kiley's theorem) 76
7.8 (Group theoretic result and application) 80
7.9 (Another group theoretic preliminary) 82
7.10 Proof of Theorem 7.5 83
7.11 (N(p) for some small genera) 84
7.15 (Sharpness of bounds in Theorem 7.7) 89
7.16 (N(n + 1) for all primes n) 91
7.17 (N(2n + 1) for all primes n) 93

References 99

Index 102