

# Table of Contents

## **Chapter 1     Introduction**

- 1.1 Integral Extensions
- 1.2 Localization

## **Chapter 2     Norms, Traces and Discriminants**

- 2.1 Norms and traces
- 2.2 The Basic Setup For Algebraic Number Theory
- 2.3 The Discriminant

## **Chapter 3     Dedekind Domains**

- 3.1 The Definition and Some Basic Properties
- 3.2 Fractional Ideals
- 3.3 Unique Factorization of Ideals
- 3.4 Some Arithmetic in Dedekind Domains

## **Chapter 4     Factorization of Prime Ideals in Extensions**

- 4.1 Lifting of Prime Ideals
- 4.2 Norms of ideals
- 4.3 A Practical Factorization Theorem

## **Chapter 5     The Ideal Class Group**

- 5.1 Lattices
- 5.2 A Volume Calculation
- 5.3 The Canonical Embedding

## **Chapter 6     The Dirichlet Unit Theorem**

- 6.1 Preliminary Results
- 6.2 Statement and Proof of Dirichlet's Unit Theorem
- 6.3 Units in Quadratic Fields

## **Chapter 7      Cyclotomic Extensions**

- 7.1 Some Preliminary Calculations
- 7.2 An Integral Basis of a Cyclotomic Field

## **Chapter 8      Factorization of Prime Ideals in Galois Extensions**

- 8.1 Decomposition and Inertia Groups
- 8.2 The Frobenius Automorphism
- 8.3 Applications

## **Chapter 9      Local Fields**

- 9.1 Absolute Values and Discrete Valuations
- 9.2 Absolute Values on the Rationals
- 9.3 Artin-Whaples Approximation Theorem
- 9.4 Completions
- 9.5 Hensel's Lemma

## **Appendices**

- A. Quadratic Reciprocity Via Gauss Sums
- B. Extension of Absolute Values
- C. The Different