METADATA

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Other Titles: An Introduction

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Abstract

This is a modern book covering classical Algebraic Number Theory, a branch of Number Theory originally motivated by Fermat's conjecture. The book begins by providing the formulations of the respective theorems and their proofs in the most simple, non-trivial setting, namely that of quadratic fields. In the following chapters basic notions are, including for example Integral Dependence, Dedekind Rings, Norm of the Elements, Trace, Integral Basis, Norm of Ideals, Class Numbers, Law of Analysis of Prime Ideals, Minkowski's Theorem, the Finiteness of the Class Number as well as Dirichlet's Unit Theorem. These contents correspond to the undergraduate part of a basic course on Algebraic Number Theory. The following chapters cover Hilbert's Ramification Theory, the General Reciprocity Law for Abelian Extensions of Number Fields (note that for the non-Abelian case, the problem is in general open and a part of the so called "Langlands Philosophy"), the Discriminant and Different theorems and the Kronecker-Weber theorem. These are more advanced subjects and in our view suitable for an advanced undergraduate course. Finally the last two chapters return to Fermat's Conjecture, study the results of Kummer and describe the complete proof of the Conjecture through the results of Frey, Serre, Ribet and Wiles. This last chapter is mostly based on specific methods and techniques of the so called Arithmetic Algebraic Geometry, and contains elements from the Theory of Elliptic Curves, Modular Forms and Galois Representations. The book contains numerous examples, a large number of exercises and extensive bibliography. As a prerequisite we expect that the reader has some basic knowledge of Galois Theory and the contents of the Appendix (chapter XIII) of the book. We aspire that the present book will be particularly useful not only for students but for anyone interested in getting a glimpse of the beauty of Number Theory.