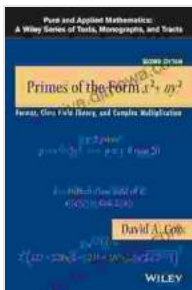


Fermat Class Field Theory and Complex Multiplication: A Journey into the Heart of Number Theory

Number theory, the study of the properties and relationships of whole numbers, has captivated mathematicians for centuries. One of its most intriguing and challenging frontiers is the realm of Fermat class field theory and complex multiplication. These theories, intertwined through a rich tapestry of mathematical concepts, have profound implications for the study of algebraic numbers, modular forms, and complex analysis.



Primes of the Form $x^2 + ny^2$: Fermat, Class Field Theory, and Complex Multiplication (Pure and Applied Mathematics: A Wiley Series of Texts, Monographs and Tracts Book 119) by David A. Cox

★★★★☆ 4.7 out of 5

Language	: English
File size	: 18538 KB
Text-to-Speech	: Enabled
Screen Reader	: Supported
Enhanced typesetting	: Enabled
Print length	: 386 pages
Lending	: Enabled



Fermat Class Field Theory: A Bridge between Number Theory and Algebra

Fermat class field theory explores the connection between the ring of integers in a number field (a field that extends the rational numbers) and its

group of ideal classes. A central concept is the construction of class fields, which are algebraic extensions of the original number field with remarkable properties. These fields provide a framework for understanding the structure of ideals, the building blocks of arithmetic in number fields.

Fermat class field theory was first developed in the 1840s by Leopold Kronecker and Ernst Kummer. They proved that for any prime number p , there exists a class field whose Galois group is isomorphic to the p -th cyclotomic extension of the rational numbers. This result, known as the Kronecker-Weber theorem, lays the foundation for the theory and has far-reaching consequences in number theory.

Complex Multiplication: A Window into the World of Modularity

Complex multiplication is a fascinating phenomenon that occurs when the ring of integers in a number field has a maximal order that is non-commutative. This non-commutativity gives rise to a one-to-one correspondence between the maximal order and a complex analytic object called a modular form.

The theory of complex multiplication was pioneered by Carl Friedrich Gauss in the early 19th century. Gauss discovered that the complex multiplication of a number field is closely related to the elliptic functions that are used to study the geometry of curves. This connection opened up an entirely new perspective on the study of number theory, bridging the gap between arithmetic and geometry.

The Interplay of Fermat Class Field Theory and Complex Multiplication

The relationship between Fermat class field theory and complex multiplication is a deep and intricate one. For number fields with complex multiplication, the class field tower associated with the ring of integers has a particularly regular structure. This regularity can be explained using modular forms, which provide a modular interpretation of the class field theory.

Conversely, Fermat class field theory can be used to study the complex multiplication of number fields. It can be shown that the existence of complex multiplication in a number field is equivalent to the existence of a certain type of class field. This result has led to important insights into the structure and properties of number fields with complex multiplication.

Applications in Cryptography and Coding Theory

Fermat class field theory and complex multiplication have found applications in various fields, including cryptography and coding theory. The modularity of complex multiplication has been instrumental in the development of elliptic curve cryptography, which is widely used for secure communication and digital signatures.

Furthermore, the theory of Fermat class fields has been applied in the design of error-correcting codes, which are used to protect data from transmission errors. The regular structure of the class field tower for number fields with complex multiplication has led to the construction of efficient and reliable coding schemes.

'Fermat Class Field Theory and Complex Multiplication' is a comprehensive and authoritative treatise that explores the intricacies of these fascinating theories. Written by renowned experts in the field, this book provides a

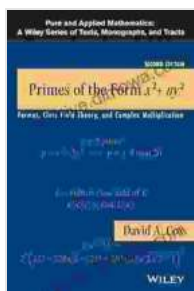
thorough treatment of the fundamental concepts, recent developments, and applications of Fermat class field theory and complex multiplication.

Whether you are a seasoned mathematician seeking to deepen your understanding of number theory, a student delving into the foundations of algebra and complex analysis, or a professional in cryptography and coding theory seeking to leverage these theories for practical applications, this book is an invaluable resource. It is a must-read for anyone interested in the beauty and power of mathematics.

Free Download Your Copy Today!

Unlock the secrets of number theory with 'Fermat Class Field Theory and Complex Multiplication'. Free Download your copy now and embark on an enlightening journey into the heart of mathematics.

Free Download Now



Primes of the Form $x^2 + ny^2$: Fermat, Class Field Theory, and Complex Multiplication (Pure and Applied Mathematics: A Wiley Series of Texts, Monographs and Tracts Book 119) by David A. Cox

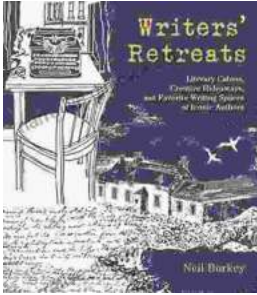
★★★★☆ 4.7 out of 5

Language : English
File size : 18538 KB
Text-to-Speech : Enabled
Screen Reader : Supported
Enhanced typesetting : Enabled
Print length : 386 pages
Lending : Enabled

FREE

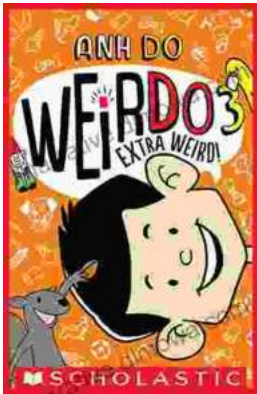
DOWNLOAD E-BOOK





Literary Cabins: A Glimpse into the Creative Havens of Iconic Authors

Unveiling the secrets of literary creation, 'Literary Cabins: Creative Hideaways and Favorite Writing Spaces of Iconic Authors' offers a tantalizing glimpse into the private...



Embark on an Extraordinary Journey with Anh Do's "Extra Weird Weirdo"

Dive into the Hilarious, Heartfelt, and Utterly Bizarre World of the Acclaimed Comedian and Author Prepare yourself for a literary adventure like no other as Anh Do, the...