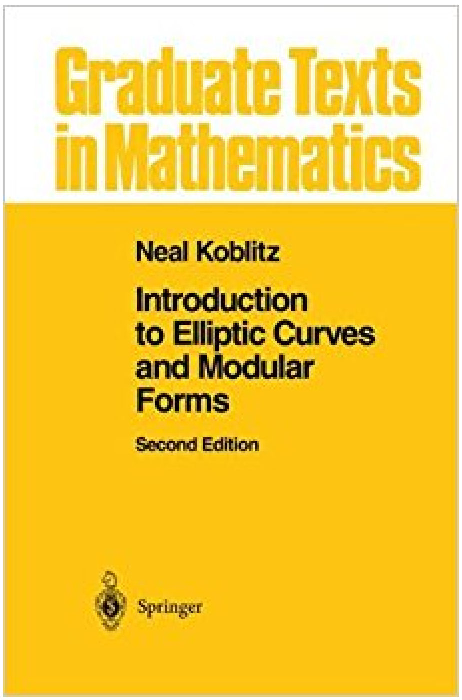
Introduction To Elliptic Curves And Modular Forms (Graduate Texts In Mathematics)



Synopsis

The theory of elliptic curves and modular forms provides a fruitful meeting ground for such diverse areas as number theory, complex analysis, algebraic geometry, and representation theory. This book starts out with a problem from elementary number theory and proceeds to lead its reader into the modern theory, covering such topics as the Hasse-Weil L-function and the conjecture of Birch and Swinnerton-Dyer. This new edition details the current state of knowledge of elliptic curves.

Book Information

Series: Graduate Texts in Mathematics (Book 97)

Hardcover: 252 pages

Publisher: Springer; 2nd edition (April 29, 1993)

Language: English

ISBN-10: 0387979662

ISBN-13: 978-0387979663

Product Dimensions: 6.1 x 0.6 x 9.2 inches

Shipping Weight: 15.2 ounces (View shipping rates and policies)

Average Customer Review: 5.0 out of 5 stars 6 customer reviews

Best Sellers Rank: #776,864 in Books (See Top 100 in Books) #131 inÃ Â Books > Science & Math > Mathematics > Geometry & Topology > Algebraic Geometry #256 inÃ Â Books > Science & Math > Mathematics > Pure Mathematics > Number Theory #464 inÃ Â Books > Textbooks > Science & Mathematics > Mathematics > Geometry

Customer Reviews

Neal Koblitz is a Professor of Mathematics at the University of Washington in the Department of Mathematics. He is also an adjunct professor with the Centre for Applied Cryptographic Research at the University of Waterloo. He is the creator of hyperelliptic curve cryptography and the independent co-creator of elliptic curve cryptography. Professor Koblitz received his undergraduate degree from Harvard University, where he was a Putnam Fellow, in 1969. He received his Ph.D. from Princeton University in 1974 under the direction of Nickolas Katz. --This text refers to an out of print or unavailable edition of this title.

There are several other excellent works in the field of elliptic curves and in modular forms. However, there are several features about this book that make it truly unique. Of all the works that I've seen in the area, I have found Koblitz's work to be the most accessible and easy to follow. Among the many plus points of the book, are the large number of problems that are presented and the answers to selected problems that are available at the end of the book. For a graduate student in the field, it is invaluable to work out a good number of problems and Koblitz's book is ideal for undertaking such a task.The book is divided into four major sections. The first, quite interestingly, develops the theory of elliptic curves starting from congruent numbers. The discussion on elliptic functions, the Weierstrass form, etc are all very nicely done. The second section involves looking at the Hasse-Weil L-function of an elliptic curve. The discussion on the Riemann zeta function and the functional equation of the Hasse-Weil L-function were very informative and easy to understand, without sacrificing rigour. The last two sections deal with modular forms. The first of the two involves studying the SL(2,Z) group, developing modular forms for this group and a brief discussion of theta functions and Hecke operators. The last section is in many ways the most interesting, dealing with modular forms of half-integer weight and finishing with the theorems by Shimura, Tunnell, etc.For a book that is barely 200 pages long, there is a good range of topics covered, and the presentation is very elegant. The book maintains a high standard of rigour throughout and deserves all the praise that it has rightfully earned. My only crib, and it is a minor one, is that the transition from elliptic curves to modular forms is not an entirely seamless one.

Koblitz is in his element with this text. Much like Daniel Marcus's Number Fields, Koblitz develops a ground work to begin the study of elliptic curves. Here he builds upon the ancient problem of congruent numbers to help develop motivation for an in depth study of elliptic curves and modular forms. Not for the faint of (mathematical) heart, but a truly brilliant piece added to the number theoretic literature. A must own for those interested in advanced ideas behind elliptic curves.

This is a very well thought out and accessible introduction to modular forms that paves he way to further study and research. While not as general as Miyake and others, it explains the fundamental concepts driving the subject in a down to earth fashion not seen in modern text. Plus it leads to Shimura's ground breaking work on half integer weight modular forms and Tunnell's work on the congruent number problem, and its relation to the Swinnerton-Dyer conjecture. Motivated by the congruent number problem it aims and gets there.

This is not an easy book---it's certainly intended for graduate students---but it's also clearly the best introduction to the mathematics that give rise to the Taniyama-Shimura conjecture and the ideas that underlie the Wiles proof of Fermat's Last Theorem, and as such it deserves a prominent place in the world’s intellectual life. And you have to love a math text that has a beautiful frontispiece (a sketch by Fomenko whose mathematical meaning I am still trying to work out).

The book provides an excellent and readable introduction to elliptic curves, using the complex analysis approach. It gives detailed proof to many theorems, and the exercises for each chapter are wonderful. It is a good supplement for those who use another book by Koblitz: Algebraic Aspects of Cryptography (AAC). It is funny that Koblitz has copied and pasted some of the paragraphs from Introduction to Elliptic Curves and Modular Forms to AAC!

I carefully worked through most of Koblitz’s book. It is well written and worth the time to study if you are interested in modular forms and elliptic curves.