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Modular Units - D. Kubert 1981-09-08

In the present book, we have put together the basic theory of the units and cuspidal divisor class group in the modular function fields, developed over the past few years. Let \mathfrak{H} be the upper half plane, and N a positive integer. Let $\Gamma(N)$ be the subgroup of $SL(2, \mathbb{Z})$ consisting of those matrices $\equiv 1 \pmod{N}$. Then $\Gamma(N) \backslash \mathfrak{H}$ is complex analytic isomorphic to an affine curve $Y(N)$, whose compactification is called the modular curve $X(N)$. The affine ring of regular functions on $Y(N)$ over \mathbb{C} is the integral closure of $\mathbb{C}[j]$ in the function field of $X(N)$ over \mathbb{C} . Here j is the classical modular function. However, for arithmetic applications, one considers the curve as defined over the cyclotomic field $\mathbb{Q}(\zeta_N)$ of N -th roots of unity, and one takes the integral closure either of $\mathbb{Q}(\zeta_N)[j]$ or $\mathbb{Z}(\zeta_N)[j]$, depending on how much arithmetic one wants to throw in. The units in these rings consist of those modular functions which have no zeros or poles in the upper half plane. The points of $X(N)$ which lie at infinity, that is which do not correspond to points on the above affine set, are called the cusps, because of the way they look in a fundamental domain in the upper half plane. They generate a subgroup of the divisor class group, which turns out to be finite, and is called the cuspidal divisor class group.

Modular Forms - Robert Alexander Rankin 1984

Modular Forms, a Computational Approach - William A. Stein 2007-02-13

This marvellous and highly original book fills a significant gap in the extensive literature on classical modular forms. This is not just yet another introductory text to this theory, though it could certainly be used as such in conjunction with more traditional treatments. Its novelty lies in its computational emphasis throughout: Stein not only defines what modular forms are, but shows in illuminating detail how one can compute everything about them in practice. This is illustrated throughout the book with examples from his own (entirely free) software package SAGE, which really bring the subject to life while not detracting in any way from its theoretical beauty. The author is the leading expert in computations with modular forms, and what he says on this subject is all tried and tested and based on his extensive experience. As well as being an invaluable companion to those learning the theory in a more traditional way, this book will be a great help to those who wish to use modular forms in applications, such as in the explicit solution of Diophantine equations. There is also a useful Appendix by Gunnells on extensions to more general

modular forms, which has enough in it to inspire many PhD theses for years to come. While the book's main readership will be graduate students in number theory, it will also be accessible to advanced undergraduates and useful to both specialists and non-specialists in number theory. --John E. Cremona, University of Nottingham
William Stein is an associate professor of mathematics at the University of Washington at Seattle. He earned a PhD in mathematics from UC Berkeley and has held positions at Harvard University and UC San Diego. His current research interests lie in modular forms, elliptic curves, and computational mathematics.

Algebraic Geometry - I. Dolgachev
2006-11-15

Viscosity Solutions and Applications -
Martino Bardi 2006-11-14

The volume comprises five extended surveys on the recent theory of viscosity solutions of fully nonlinear partial differential equations, and some of its most relevant applications to optimal control theory for deterministic and stochastic systems, front propagation, geometric motions and mathematical finance. The volume forms a state-of-the-art reference on the subject of viscosity solutions, and the authors are among the most prominent specialists. Potential readers are researchers in nonlinear PDE's, systems theory, stochastic processes.

Integral Geometry, Radon Transforms and Complex Analysis - Carlos A. Berenstein
2006-11-14

This book contains the notes of five short courses delivered at the "Centro Internazionale Matematico Estivo" session "Integral Geometry, Radon Transforms and Complex Analysis" held in Venice (Italy) in June 1996: three of them deal with various aspects of integral geometry, with a common emphasis on several kinds of Radon transforms, their properties and applications, the other two share a stress on CR manifolds and related problems. All lectures are accessible to a wide audience, and provide self-contained introductions and

short surveys on the subjects, as well as detailed expositions of selected results.
Mathematical Reviews - 2008

Comprehensive Dissertation Index:
Mathematics & statistics. Physics, A-E - 1984

Rational Points on Varieties - Bjorn Poonen 2017-12-13

This book is motivated by the problem of determining the set of rational points on a variety, but its true goal is to equip readers with a broad range of tools essential for current research in algebraic geometry and number theory. The book is unconventional in that it provides concise accounts of many topics instead of a comprehensive account of just one—this is intentionally designed to bring readers up to speed rapidly. Among the topics included are Brauer groups, faithfully flat descent, algebraic groups, torsors, étale and fppf cohomology, the Weil conjectures, and the Brauer-Manin and descent obstructions. A final chapter applies all these to study the arithmetic of surfaces. The down-to-earth explanations and the over 100 exercises make the book suitable for use as a graduate-level textbook, but even experts will appreciate having a single source covering many aspects of geometry over an unrestricted ground field and containing some material that cannot be found elsewhere.

A First Course in Modular Forms - Fred Diamond 2006-03-30

This book introduces the theory of modular forms, from which all rational elliptic curves arise, with an eye toward the Modularity Theorem. Discussion covers elliptic curves as complex tori and as algebraic curves; modular curves as Riemann surfaces and as algebraic curves; Hecke operators and Atkin-Lehner theory; Hecke eigenforms and their arithmetic properties; the Jacobians of modular curves and the Abelian varieties associated to Hecke eigenforms. As it presents these ideas, the book states the Modularity Theorem in various forms, relating them to each other and touching on their applications to number theory. The authors assume no background in algebraic

number theory and algebraic geometry. Exercises are included.

The Arithmetic of Function Fields -

David Goss 2011-06-24

This series is devoted to the publication of monographs, lecture resp. seminar notes, and other materials arising from programs of the OSU Mathematical Research Institute. This includes proceedings of conferences or workshops held at the Institute, and other mathematical writings.

Reviews in Number Theory, 1984-96 - 1997

Reviews in Number Theory, as Printed in Mathematical Reviews, 1940 Through 1972, Volumes 1-44 Inclusive -

William Judson LeVeque 1974

Orbites Unipotentes Et Représentations - 1988

Algorithmic Algebra and Number Theory -

B.Heinrich Matzat 1999

This book contains 22 lectures presented at the final conference of the German research program "Algorithmic Number Theory and Algebra 1991-1997", sponsored by the Deutsche Forschungsgemeinschaft. The purpose of this research program and the meeting was to bring together developers of computer algebra software and researchers using computational methods to gain insight into experimental problems and theoretical questions in algebra and number theory. The book gives an overview on algorithmic methods and results obtained during this period mainly in algebraic number theory, commutative algebra and algebraic geometry, and group and representation theory. Some of the articles illustrate the current state of the computer algebra systems developed with support from the research program, for example KANT and LiDIA for algebraic number theory, SINGULAR, REDLOG and INVAR for commutative algebra and invariant theory respectively, and GAP, SYSYPHOS and CHEVIE for group and representation theory.

Normal Surface Singularities - András Némethi 2022-10-07

This monograph provides a comprehensive

introduction to the theory of complex normal surface singularities, with a special emphasis on connections to low-dimensional topology. In this way, it unites the analytic approach with the more recent topological one, combining their tools and methods. In the first chapters, the book sets out the foundations of the theory of normal surface singularities. This includes a comprehensive presentation of the properties of the link (as an oriented 3-manifold) and of the invariants associated with a resolution, combined with the structure and special properties of the line bundles defined on a resolution. A recurring theme is the comparison of analytic and topological invariants. For example, the Poincaré series of the divisorial filtration is compared to a topological zeta function associated with the resolution graph, and the sheaf cohomologies of the line bundles are compared to the Seiberg-Witten invariants of the link. Equivariant Ehrhart theory is introduced to establish surgery-additivity formulae of these invariants, as well as for the regularization procedures of multivariable series. In addition to recent research, the book also provides expositions of more classical subjects such as the classification of plane and cuspidal curves, Milnor fibrations and smoothing invariants, the local divisor class group, and the Hilbert-Samuel function. It contains a large number of examples of key families of germs: rational, elliptic, weighted homogeneous, superisolated and splice-quotient. It provides concrete computations of the topological invariants of their links (Casson(-Walker) and Seiberg-Witten invariants, Turaev torsion) and of the analytic invariants (geometric genus, Hilbert function of the divisorial filtration, and the analytic semigroup associated with the resolution). The book culminates in a discussion of the topological and analytic lattice cohomologies (as categorifications of the Seiberg-Witten invariant and of the geometric genus respectively) and of the graded roots. Several open problems and conjectures are also formulated. Normal Surface Singularities provides researchers in

algebraic and differential geometry, singularity theory, complex analysis, and low-dimensional topology with an invaluable reference on this rich topic, offering a unified presentation of the major results and approaches.

Frobenius Splitting Methods in Geometry and Representation Theory -

Michel Brion 2007-08-08

Systematically develops the theory of Frobenius splittings and covers all its major developments. Concise, efficient exposition unfolds from basic introductory material on Frobenius splittings—definitions, properties and examples—to cutting edge research.

Collected Papers II - Serge Lang 2000-05-19

Serge Lang is not only one of the top mathematicians of our time, but also an excellent writer. He has made innumerable and invaluable contributions in diverse fields of mathematics and was honoured with the Cole Prize by the American Mathematical Society as well as with the Prix Carriere by the French Academy of Sciences. Here, 83 of his research papers are collected in four volumes, ranging over a variety of topics of interest to many readers.

Integral Closure of Ideals, Rings, and Modules - Craig Huneke 2006-10-12

Ideal for graduate students and researchers, this book presents a unified treatment of the central notions of integral closure.

Drinfeld Modules, Modular Schemes And Applications - Van Der Put M 1997-08-27

Oxidative DNA damage is implicated in several major human diseases including cancer and neurological disorders, together with some forms of diabetes as well as aging. The direction of research in this area needs to keep pace with advances in technology. However, until now there has been no single book that covers and reviews all of the major chemical and biochemical aspects associated with oxidative DNA damage. This timely textbook therefore contains an up-to-date account of this rapidly developing area at the interface of chemistry and biology.

Comprehensive Dissertation Index - 1984

Vols. for 1973- include the following subject

areas: Biological sciences, Agriculture, Chemistry, Environmental sciences, Health sciences, Engineering, Mathematics and statistics, Earth sciences, Physics, Education, Psychology, Sociology, Anthropology, History, Law & political science, Business & economics, Geography & regional planning, Language & literature, Fine arts, Library & information science, Mass communications, Music, Philosophy and Religion.

Automorphic Forms on GL (2) - H. Jacquet 2006-11-15

Annales Scientifiques de L'École Normale Supérieure - École normale supérieure (France) 2003

Berkeley Lectures on P-adic Geometry - Peter Scholze 2020-05-26

Berkeley Lectures on p-adic Geometry presents an important breakthrough in arithmetic geometry. In 2014, leading mathematician Peter Scholze delivered a series of lectures at the University of California, Berkeley, on new ideas in the theory of p-adic geometry. Building on his discovery of perfectoid spaces, Scholze introduced the concept of “diamonds,” which are to perfectoid spaces what algebraic spaces are to schemes. The introduction of diamonds, along with the development of a mixed-characteristic shtuka, set the stage for a critical advance in the discipline. In this book, Peter Scholze and Jared Weinstein show that the moduli space of mixed-characteristic shtukas is a diamond, raising the possibility of using the cohomology of such spaces to attack the Langlands conjectures for a reductive group over a p-adic field. This book follows the informal style of the original Berkeley lectures, with one chapter per lecture. It explores p-adic and perfectoid spaces before laying out the newer theory of shtukas and their moduli spaces. Points of contact with other threads of the subject, including p-divisible groups, p-adic Hodge theory, and Rapoport-Zink spaces, are thoroughly explained. Berkeley Lectures on p-adic Geometry will be a useful resource

for students and scholars working in arithmetic geometry and number theory.

3264 and All That - David Eisenbud

2016-04-14

This book can form the basis of a second course in algebraic geometry. As motivation, it takes concrete questions from enumerative geometry and intersection theory, and provides intuition and technique, so that the student develops the ability to solve geometric problems. The authors explain key ideas, including rational equivalence, Chow rings, Schubert calculus and Chern classes, and readers will appreciate the abundant examples, many provided as exercises with solutions available online. Intersection is concerned with the enumeration of solutions of systems of polynomial equations in several variables. It has been an active area of mathematics since the work of Leibniz. Chasles' nineteenth-century calculation that there are 3264 smooth conic plane curves tangent to five given general conics was an important landmark, and was the inspiration behind the title of this book. Such computations were motivation for Poincaré's development of topology, and for many subsequent theories, so that intersection theory is now a central topic of modern mathematics.

[Lectures on Logarithmic Algebraic Geometry](#)

- Arthur Ogus 2018-11-08

This graduate textbook offers a self-contained introduction to the concepts and techniques of logarithmic geometry, a key tool for analyzing compactification and degeneration in algebraic geometry and number theory. It features a systematic exposition of the foundations of the field, from the basic results on convex geometry and commutative monoids to the theory of logarithmic schemes and their de Rham and Betti cohomology. The book will be of use to graduate students and researchers working in algebraic, analytic, and arithmetic geometry as well as related fields.

[Encyclopaedia of Mathematics](#) - Michiel

Hazewinkel 2013-12-01

This ENCYCLOPAEDIA OF MATHEMATICS aims to be a reference work for all parts of

mathematics. It is a translation with updates and editorial comments of the Soviet Mathematical Encyclopaedia published by 'Soviet Encyclopaedia Publishing House' in five volumes in 1977-1985. The annotated translation consists of ten volumes including a special index volume. There are three kinds of articles in this ENCYCLOPAEDIA. First of all there are survey-type articles dealing with the various main directions in mathematics (where a rather fine subdivision has been used). The main requirement for these articles has been that they should give a reasonably complete up-to-date account of the current state of affairs in these areas and that they should be maximally accessible. On the whole, these articles should be understandable to mathematics students in their first specialization years, to graduates from other mathematical areas and, depending on the specific subject, to specialists in other domains of science, engineers and teachers of mathematics. These articles treat their material at a fairly general level and aim to give an idea of the kind of problems, techniques and concepts involved in the area in question. They also contain background and motivation rather than precise statements of precise theorems with detailed definitions and technical details on how to carry out proofs and constructions. The second kind of article, of medium length, contains more detailed concrete problems, results and techniques.

Lectures on K3 Surfaces - Daniel Huybrechts
2016-09-26

K3 surfaces are central objects in modern algebraic geometry. This book examines this important class of Calabi–Yau manifolds from various perspectives in eighteen self-contained chapters. It starts with the basics and guides the reader to recent breakthroughs, such as the proof of the Tate conjecture for K3 surfaces and structural results on Chow groups. Powerful general techniques are introduced to study the many facets of K3 surfaces, including arithmetic, homological, and differential geometric aspects. In this context, the book covers Hodge structures, moduli spaces,

periods, derived categories, birational techniques, Chow rings, and deformation theory. Famous open conjectures, for example the conjectures of Calabi, Weil, and Artin-Tate, are discussed in general and for K3 surfaces in particular, and each chapter ends with questions and open problems. Based on lectures at the advanced graduate level, this book is suitable for courses and as a reference for researchers.

Categorification and Higher Representation Theory - Anna Beliakova 2017-02-21

The emergent mathematical philosophy of categorification is reshaping our view of modern mathematics by uncovering a hidden layer of structure in mathematics, revealing richer and more robust structures capable of describing more complex phenomena. Categorified representation theory, or higher representation theory, aims to understand a new level of structure present in representation theory. Rather than studying actions of algebras on vector spaces where algebra elements act by linear endomorphisms of the vector space, higher representation theory describes the structure present when algebras act on categories, with algebra elements acting by functors. The new level of structure in higher representation theory arises by studying the natural transformations between functors. This enhanced perspective brings into play a powerful new set of tools that deepens our understanding of traditional representation theory. This volume exhibits some of the current trends in higher representation theory and the diverse techniques that are being employed in this field with the aim of showcasing the many applications of higher representation theory. The companion volume (Contemporary Mathematics, Volume 684) is devoted to categorification in geometry, topology, and physics.

[Advances in Theoretical and Mathematical Physics](#) - 1999

Classical Algebraic Geometry - Igor V. Dolgachev 2012-08-16
Algebraic geometry has benefited

enormously from the powerful general machinery developed in the latter half of the twentieth century. The cost has been that much of the research of previous generations is in a language unintelligible to modern workers, in particular, the rich legacy of classical algebraic geometry, such as plane algebraic curves of low degree, special algebraic surfaces, theta functions, Cremona transformations, the theory of apolarity and the geometry of lines in projective spaces. The author's contemporary approach makes this legacy accessible to modern algebraic geometers and to others who are interested in applying classical results. The vast bibliography of over 600 references is complemented by an array of exercises that extend or exemplify results given in the book.

Algebraic Number Theory and Diophantine Analysis - F. Halter-Koch 2000-01-01

The series is aimed specifically at publishing peer reviewed reviews and contributions presented at workshops and conferences. Each volume is associated with a particular conference, symposium or workshop. These events cover various topics within pure and applied mathematics and provide up-to-date coverage of new developments, methods and applications.

An Introduction to the Langlands Program - Joseph Bernstein 2013-12-11

This book presents a broad, user-friendly introduction to the Langlands program, that is, the theory of automorphic forms and its connection with the theory of L-functions and other fields of mathematics. Each of the twelve chapters focuses on a particular topic devoted to special cases of the program. The book is suitable for graduate students and researchers.

[Problems on Mapping Class Groups and Related Topics](#) - Benson Farb 2006-09-12

The appearance of mapping class groups in mathematics is ubiquitous. The book presents 23 papers containing problems about mapping class groups, the moduli space of Riemann surfaces, Teichmüller geometry, and related areas. Each paper focusses completely on open problems and directions. The problems range in scope

from specific computations, to broad programs. The goal is to have a rich source of problems which have been formulated explicitly and accessibly. The book is divided into four parts. Part I contains problems on the combinatorial and (co)homological group-theoretic aspects of mapping class groups, and the way in which these relate to problems in geometry and topology. Part II concentrates on connections with classification problems in 3-manifold theory, the theory of symplectic 4-manifolds, and algebraic geometry. A wide variety of problems, from understanding billiard trajectories to the classification of Kleinian groups, can be reduced to differential and synthetic geometry problems about moduli space. Such problems and connections are discussed in Part III. Mapping class groups are related, both concretely and philosophically, to a number of other groups, such as braid groups, lattices in semisimple Lie groups, and automorphism groups of free groups. Part IV concentrates on problems surrounding these relationships. This book should be of interest to anyone studying geometry, topology, algebraic geometry or infinite groups. It is meant to provide inspiration for everyone from graduate students to senior researchers.

Documenta Mathematica - 2000

The Arithmetic of Elliptic Curves - Joseph H. Silverman 2013-03-09

The theory of elliptic curves is distinguished by its long history and by the diversity of the methods that have been used in its study. This book treats the arithmetic approach in its modern formulation, through the use of basic algebraic number theory and algebraic geometry. Following a brief discussion of the necessary algebro-geometric results, the book proceeds with an exposition of the geometry and the formal group of elliptic curves, elliptic curves over finite fields, the complex numbers, local fields, and global fields. Final chapters deal with integral and rational points, including Siegel's theorem and explicit computations for the curve $Y^2 = X^3 + DX$, while three appendices conclude

the whole: Elliptic Curves in Characteristics 2 and 3, Group Cohomology, and an overview of more advanced topics.

The K-book - Charles A. Weibel
2013-06-13

Informally, K -theory is a tool for probing the structure of a mathematical object such as a ring or a topological space in terms of suitably parameterized vector spaces and producing important intrinsic invariants which are useful in the study of algebraic Mathematics of the USSR. - 1976

A Primer on Mapping Class Groups - Benson Farb 2012

The study of the mapping class group $\text{Mod}(S)$ is a classical topic that is experiencing a renaissance. It lies at the juncture of geometry, topology, and group theory. This book explains as many important theorems, examples, and techniques as possible, quickly and directly, while at the same time giving full details and keeping the text nearly self-contained. The book is suitable for graduate students. *A Primer on Mapping Class Groups* begins by explaining the main group-theoretical properties of $\text{Mod}(S)$, from finite generation by Dehn twists and low-dimensional homology to the Dehn-Nielsen-Baer theorem. Along the way, central objects and tools are introduced, such as the Birman exact sequence, the complex of curves, the braid group, the symplectic representation, and the Torelli group. The book then introduces Teichmüller space and its geometry, and uses the action of $\text{Mod}(S)$ on it to prove the Nielsen-Thurston classification of surface homeomorphisms. Topics include the topology of the moduli space of Riemann surfaces, the connection with surface bundles, pseudo-Anosov theory, and Thurston's approach to the classification.

Heegner Points and Rankin L-Series - Henri Darmon 2004-06-21

The seminal formula of Gross and Zagier relating heights of Heegner points to derivatives of the associated Rankin L-series has led to many generalisations and extensions in a variety of different

directions, spawning a fertile area of study that remains active to this day. This volume, based on a workshop on Special Values of Rankin L-series held at the MSRI in December 2001, is a collection of thirteen articles written by many of the leading contributors in the field, having the Gross-Zagier formula and its avatars as a common

unifying theme. It serves as a valuable reference for mathematicians wishing to become further acquainted with the theory of complex multiplication, automorphic forms, the Rankin-Selberg method, arithmetic intersection theory, Iwasawa theory, and other topics related to the Gross-Zagier formula.