Meromorphic Functions And Projective Curves

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Introduction to Algebraic Curves Phillip Griffiths 1989 This book offers a comprehensive treatment of geometric analysis on symmetric spaces, with applications to representation theory. The author's thorough, accurate approach brings the reader up to date on current research in analysis on symmetric spaces and the analytic approach to the representation theory of semisimple Lie groups. The author is a 1988 Steele Prize recipient for his earlier books in this area.
Compact Riemann Surfaces and Algebraic Curves Kichoon Yang 1988-11-01 This volume is an introduction to the theory of Compact Riemann Surfaces and algebraic curves. It gives a concise account of the elementary aspects of different viewpoints in curve theory. Foundational results on divisors and compact Riemann surfaces are also stated and proved. Contents:Topological Preliminaries —Singular Homology and Relative HomologyCellular HomologyDe Rham CohomologyCommutative Algebra — An Introduction —Closed Ideals and VarietiesCoordinate RingsDimension TheoryIntersection NumbersSingular Plane Curves —The Classical Plücker FormulaeDivisors on a Compact Complex Manifold —Divisors and Holomorphic Line BundlesLinear Systems on a Compact Riemann Surface and Holomorphic MapsCompact Riemann Surfaces —The Jacobian Variety and Abel's TheoremThe Riemann-Roch Theorem and the Canonical EmbeddingHyperelliptic Riemann Surfaces and the Weierstrass PointsGeometry of Projective Curves — The Complex Flag ManifoldMetric Geometry of Projective CurvesPlücker Formulae for Projective Algebraic CurvesHarmonic Maps from a Compact Riemann SurfaceA Brief Look at Algebraic Surfaces —The Intersection FormBlow-Ups and Rational MapsThe Kodaira Dimension of an Algebraic Surface Readership: Mathematicians. Keywords:Compact Riemann Surfaces;Algebraic Curves;Compact Complex Manifold;Algebraic Surfaces
Complete Minimal Surfaces of Finite Total Curvature Kichoon Yang 2013-03-09 This monograph contains an exposition of the theory of minimal surfaces in Euclidean space, with an emphasis on complete minimal surfaces of finite total curvature. Our exposition is based upon the philosophy that the study of finite total curvature complete minimal surfaces in R3, in large measure, coincides with the study of meromorphic functions and linear series on compact Riemann sur faces. This philosophy is first indicated in the fundamental theorem of Chern and Osserman: A complete minimal surface M immersed in R3 is of finite total curvature if and only if M with its induced conformal structure is conformally equivalent to a compact Riemann surface Mg punctured at a finite set E of points and the tangential Gauss map extends to a holomorphic map Mg _ P2. Thus a finite total curvature complete minimal surface in R3 gives rise to a plane algebraic curve. Let Mg denote a fixed but otherwise

arbitrary compact Riemann surface of genus g. A positive integer r is called a puncture number for Mg if Mg can be conformally immersed into R3 as a complete finite total curvature minimal surface with exactly r punctures; the set of all puncture numbers for Mg is denoted by P (M). For example, Jorge and Meeks [JM] showed, by constructing an example g for each r, that every positive integer r is a puncture number for the Riemann surface pl.

Elliptic Curves (Second Edition) James S Milne 2020-08-20 This book uses the beautiful theory of elliptic curves to introduce the reader to some of the deeper aspects of number theory. It assumes only a knowledge of the basic algebra, complex analysis, and topology usually taught in first-year graduate courses.An elliptic curve is a plane curve defined by a cubic polynomial. Although the problem of finding the rational points on an elliptic curve has fascinated mathematicians since ancient times, it was not until 1922 that Mordell proved that the points form a finitely generated group. There is still no proven algorithm for finding the rank of the group, but in one of the earliest important applications of computers to mathematics, Birch and Swinnerton-Dyer discovered a relation between the rank and the numbers of points on the curve computed modulo a prime. Chapter IV of the book proves Mordell's theorem and explains the conjecture of Birch and Swinnerton-Dyer.Every elliptic curve over the rational numbers has an L-series attached to it.Hasse conjectured that this L-series satisfies a functional equation, and in 1955 Taniyama suggested that Hasse's conjecture could be proved by showing that the L-series arises from a modular form. This was shown to be correct by Wiles (and others) in the 1990s, and, as a consequence, one obtains a proof of Fermat's Last Theorem. Chapter V of the book is devoted to explaining this work.The first three chapters develop the basic theory of elliptic curves.For this edition, the text has been completely revised and updated.

Schottky Groups and Mumford Curves L. Gerritzen 2006-11-14

Complex Algebraic Curves Frances Clare Kirwan 1992-02-20 This development of the theory of complex algebraic curves was one of the peaks of nineteenth century mathematics. They have many fascinating properties and arise in various areas of mathematics, from number theory to theoretical physics, and are the subject of much research. By using only the basic techniques acquired in most undergraduate courses in mathematics, Dr. Kirwan introduces the theory, observes the algebraic and topological properties of complex algebraic curves, and shows how they are related to complex analysis.

Elliptic Curves. (MN-40) Anthony W. Knapp 2018-06-05 An elliptic curve is a particular kind of cubic equation in two variables whose projective solutions form a group. Modular forms are analytic functions in the upper half plane with certain transformation laws and growth properties. The two subjects--elliptic curves and modular forms--come together in Eichler-Shimura theory, which constructs elliptic curves out of modular forms of a special kind. The converse, that all rational elliptic curves arise this way, is called the Taniyama-Weil Conjecture and is known to imply Fermat's Last Theorem. Elliptic curves and the modeular forms in the Eichler- Shimura theory both have associated L functions, and it is a consequence of the theory that the two kinds of L functions match. The theory covered by Anthony Knapp in this book is, therefore, a window into a broad expanse of mathematics--including class field theory, arithmetic algebraic geometry, and group representations--in which the concidence of L functions relates analysis and algebra in the most fundamental ways. Developing, with many examples, the elementary theory of elliptic curves, the book goes on to the subject of modular forms and the first connections with elliptic curves. The last two chapters concern Eichler-Shimura theory, which establishes a much deeper relationship between the two subjects. No other book in print treats the basic theory of elliptic curves with only undergraduate mathematics, and no other explains Eichler-Shimura theory in such an accessible manner.

Rigid Geometry of Curves and Their Jacobians Werner Lütkebohmert 2016-01-26 This book presents some of the most important aspects of rigid geometry, namely its applications to the study of smooth algebraic curves, of their Jacobians, and of abelian varieties - all of them defined over a complete non-archimedean

valued field. The text starts with a survey of the foundation of rigid geometry, and then focuses on a detailed treatment of the applications. In the case of curves with split rational reduction there is a complete analogue to the fascinating theory of Riemann surfaces. In the case of proper smooth group varieties the uniformization and the construction of abelian varieties are treated in detail. Rigid geometry was established by John Tate and was enriched by a formal algebraic approach launched by Michel Raynaud. It has proved as a means to illustrate the geometric ideas behind the abstract methods of formal algebraic geometry as used by Mumford and Faltings. This book should be of great use to students wishing to enter this field, as well as those already working in it.

Geometry, Topology, and Mathematical Physics V. M. Buchstaber 2004 This volume contains a selection of papers based on presentations given at the S. P. Novikov seminar held at the Steklov Mathematical Institute in Moscow. Topics and speakers were chosen by the well-known expert, S. P. Novikov, one of the leading mathematicians of the twentieth century. His diverse interests are the tradition of the seminar and are reflected in the topics presented in the book.

Vector Bundles on Degenerations of Elliptic Curves and Yang-Baxter Equations Igor Burban 2012 "November 2012, volume 220, number 1035 (third of 4 numbers)."

Encyclopaedia of Mathematics M. Hazewinkel 2013-12-01

A Guide to Plane Algebraic Curves Keith Kendig 2011 This is an informal and accessible introduction to plane algebraic curves that also serves as a natural entry point to algebraic geometry. There is a unifying theme to the book: give curves enough living space and beautiful theorems will follow. This book provides the reader with a solid intuition for the subject, while at the same time keeping the exposition simple and understandable, by introducing abstract concepts with concrete examples and pictures. It can be used as the text for an undergraduate course on plane algebraic curves, or as a companion to algebraic geometry at graduate level. This book is accessible to those with a limited mathematical background. This is because for those outside mathematics there is a growing need for an entre to algebraic geometry, a need created by the ever-expanding role algebraic geometry is playing in areas ranging from biology to chemistry and robotics to cryptology.

A Primer of Algebraic Geometry Huishi Li 2017-12-19 "Presents the structure of algebras appearing in representation theory of groups and algebras with general ring theoretic methods related to representation theory. Covers affine algebraic sets and the nullstellensatz, polynomial and rational functions, projective algebraic sets. Groebner basis, dimension of algebraic sets, local theory, curves and elliptic curves, and more."

Meromorphic Functions over non-Archimedean Fields Pei-Chu Hu 2000-09-30 This book introduces value distribution theory over non-Archimedean fields, starting with a survey of two Nevanlinna-type main theorems and defect relations for meromorphic functions and holomorphic curves. Secondly, it gives applications of the above theory to, e.g., abc-conjecture, Waring's problem, uniqueness theorems for meromorphic functions, and Malmquist-type theorems for differential equations over non-Archimedean fields. Next, iteration theory of rational and entire functions over non-Archimedean fields and Schmidt's subspace theorems are studied. Finally, the book suggests some new problems for further research. Audience: This work will be of interest to graduate students working in complex or diophantine approximation as well as to researchers involved in the fields of analysis, complex function theory of one or several variables, and analytic spaces.

Geometry of Algebraic Curves Enrico Arbarello 2011-03-10 The second volume of the Geometry of Algebraic Curves is devoted to the foundations of the theory of moduli of algebraic curves. Its authors are research mathematicians who have actively participated in the development of the Geometry of Algebraic Curves. The subject is an extremely fertile and active one, both within the mathematical community and at the interface with the theoretical physics community. The approach is unique in its blending of algebro-geometric, complex analytic and topological/combinatorial methods. It treats important topics such as

Teichmüller theory, the cellular decomposition of moduli and its consequences and the Witten conjecture. The careful and comprehensive presentation of the material is of value to students who wish to learn the subject and to experts as a reference source. The first volume appeared 1985 as vol. 267 of the same series.
Algebraic Geometry I V.I. Danilov 2006-12-15 "... To sum up, this book helps to learn algebraic geometry in a short time, its concrete style is enjoyable for students and reveals the beauty of mathematics." --Acta Scientiarum Mathematicarum
Geometry and Topology of Manifolds: Surfaces and Beyond Vicente Muñoz 2020-10-21 This book represents a novel approach to differential topology. Its main focus is to give a comprehensive introduction to the classification of manifolds, with special attention paid to the case of surfaces, for which the book provides a complete classification from many points of view: topological, smooth, constant curvature, complex, and conformal. Each chapter briefly revisits basic results usually known to graduate students from an alternative perspective, focusing on surfaces. We provide full proofs of some remarkable results that sometimes are missed in basic courses (e.g., the construction of triangulations on surfaces, the classification of surfaces, the Gauss-Bonnet theorem, the degree-genus formula for complex plane curves, the existence of constant curvature metrics on conformal surfaces), and we give hints to questions about higher dimensional manifolds. Many examples and remarks are scattered through the book. Each chapter ends with an exhaustive collection of problems and a list of topics for further study. The book is primarily addressed to graduate students who did take standard introductory courses on algebraic topology, differential and Riemannian geometry, or algebraic geometry, but have not seen their deep interconnections, which permeate a modern approach to geometry and topology of manifolds.
Encyclopaedia of Mathematics Michiel Hazewinkel 2012-12-06 This ENCYCLOPAEDIA OF MATHEMATICS aims to be a reference work for all parts of mathema tics. It is a translation with updates and editorial comments of the Soviet Mathematical Encyclo paedia 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 reason ably 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, en gineers 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 pre cise theorems with detailed definitions and technical details on how to carry out proofs and con structions.
Foliations on Surfaces Igor Nikolaev 2013-03-14 This book presents a comprehensive, encyclopedic approach to the subject of foliations, one of the major concepts of modern geometry and topology. It addresses graduate students and researchers and serves as a reference book for experts in the field.
Lectures on Algebraic Geometry II Günter Harder 2011-04-21 This second volume introduces the concept of shemes, reviews some commutative algebra and introduces projective schemes. The finiteness theorem for coherent sheaves is proved, here again the techniques of homological algebra and sheaf cohomology are needed. In the last two chapters, projective curves over an arbitrary ground field are discussed, the theory of Jacobians is developed, and the existence of the Picard scheme is proved. Finally, the author gives some outlook into further developments- for instance étale cohomology- and states some fundamental theorems.
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.

Introduction to Algebraic Curves Phillip A. Griffiths 1989 This book differs from a number of recent books on this subject in that it combines analytic and geometric methods at the outset, so that the reader can grasp the basic results of the subject. Although such modern techniques of sheaf theory, cohomology, and commutative algebra are not covered here, the book provides a solid foundation to proceed to more advanced texts in general algebraic geometry, complex manifolds, and Riemann surfaces, as well as algebraic curves. Containing numerous exercises this book would make an excellent introductory text.

Rational Points, Rational Curves, and Entire Holomorphic Curves on Projective Varieties Carlo Gasbarri 2015-12-22 This volume contains papers from the Short Thematic Program on Rational Points, Rational Curves, and Entire Holomorphic Curves and Algebraic Varieties, held from June 3-28, 2013, at the Centre de Recherches Mathématiques, Université de Montréal, Québec, Canada. The program was dedicated to the study of subtle interconnections between geometric and arithmetic properties of higher-dimensional algebraic varieties. The main areas of the program were, among others, proving density of rational points in Zariski or analytic topology on special varieties, understanding global geometric properties of rationally connected varieties, as well as connections between geometry and algebraic dynamics exploring new geometric techniques in Diophantine approximation. This book is co-published with the Centre de Recherches Mathématiques.

Algebraic Curves and Riemann Surfaces Rick Miranda 1995 The book was easy to understand, with many examples. The exercises were well chosen, and served to give further examples and developments of the theory. --William Goldman, University of Maryland In this book, Miranda takes the approach that algebraic curves are best encountered for the first time over the complex numbers, where the reader's classical intuition about surfaces, integration, and other concepts can be brought into play. Therefore, many examples of algebraic curves are presented in the first chapters. In this way, the book begins as a primer on Riemann surfaces, with complex charts and meromorphic functions taking center stage. But the main examples come from projective curves, and slowly but surely the text moves toward the algebraic category. Proofs of the Riemann-Roch and Serre Duality Theorems are presented in an algebraic manner, via an adaptation of the adelic proof, expressed completely in terms of solving a Mittag-Leffler problem. Sheaves and cohomology are introduced as a unifying device in the latter chapters, so that their utility and naturalness are immediately obvious. Requiring a background of one semester of complex variable theory and a year of abstract algebra, this is an excellent graduate textbook for a second-semester course in complex variables or a year-long course in algebraic geometry.

Geometry of Projective Algebraic Curves Makoto Nanba 1984

Topics in the Theory of Algebraic Function Fields Gabriel Daniel Villa Salvador 2007-10-10 The fields of algebraic functions of one variable appear in several areas of mathematics: complex analysis, algebraic geometry, and number theory. This text adopts the latter perspective by applying an arithmetic-algebraic viewpoint to the study of function fields as part of the algebraic theory of numbers. The examination explains both the similarities and fundamental differences between function fields and number fields, including many exercises and examples to enhance understanding and motivate further study. The only prerequisites are a basic knowledge of field theory, complex analysis, and some commutative algebra.

Handbook of Elliptic and Hyperelliptic Curve Cryptography Henri Cohen 2005-07-19 The

discrete logarithm problem based on elliptic and hyperelliptic curves has gained a lot of popularity as a cryptographic primitive. The main reason is that no subexponential algorithm for computing discrete logarithms on small genus curves is currently available, except in very special cases. Therefore curve-based cryptosystems require much smaller key sizes than RSA to attain the same security level. This makes them particularly attractive for implementations on memory-restricted devices like smart cards and in high-security applications. The Handbook of Elliptic and Hyperelliptic Curve Cryptography introduces the theory and algorithms involved in curve-based cryptography. After a very detailed exposition of the mathematical background, it provides ready-to-implement algorithms for the group operations and computation of pairings. It explores methods for point counting and constructing curves with the complex multiplication method and provides the algorithms in an explicit manner. It also surveys generic methods to compute discrete logarithms and details index calculus methods for hyperelliptic curves. For some special curves the discrete logarithm problem can be transferred to an easier one; the consequences are explained and suggestions for good choices are given. The authors present applications to protocols for discrete-logarithm-based systems (including bilinear structures) and explain the use of elliptic and hyperelliptic curves in factorization and primality proving. Two chapters explore their design and efficient implementations in smart cards. Practical and theoretical aspects of side-channel attacks and countermeasures and a chapter devoted to (pseudo-)random number generation round off the exposition. The broad coverage of all- important areas makes this book a complete handbook of elliptic and hyperelliptic curve cryptography and an invaluable reference to anyone interested in this exciting field.

Algebraic Geometry I V.I. Danilov 2013-12-01 "... To sum up, this book helps to learn algebraic geometry in a short time, its concrete style is enjoyable for students and reveals the beauty of mathematics." --Acta Scientiarum Mathematicarum

A Scrapbook of Complex Curve Theory Charles Herbert Clemens 2002-12-10 This fine book by Herb Clemens quickly became a favorite of many algebraic geometers when it was first published in 1980. It has been popular with novices and experts ever since. It is written as a book of ``impressions'' of a journey through the theory of complex algebraic curves. Many topics of compelling beauty occur along the way. A cursory glance at the subjects visited reveals a wonderfully eclectic selection, from conics and cubics to theta functions, Jacobians, and questions of moduli. By the end of the book, the theme of theta functions becomes clear, culminating in the Schottky problem. The author's intent was to motivate further study and to stimulate mathematical activity. The attentive reader will learn much about complex algebraic curves and the tools used to study them. The book can be especially useful to anyone preparing a course on the topic of complex curves or anyone interested in supplementing his/her reading.

Lectures on Algebraic Geometry I Günter Harder 2011-09-15 This book and the following second volume is an introduction into modern algebraic geometry. In the first volume the methods of homological algebra, theory of sheaves, and sheaf cohomology are developed. These methods are indispensable for modern algebraic geometry, but they are also fundamental for other branches of mathematics and of great interest in their own. In the last chapter of volume I these concepts are applied to the theory of compact Riemann surfaces. In this chapter the author makes clear how influential the ideas of Abel, Riemann and Jacobi were and that many of the modern methods have been anticipated by them. For this second edition the text was completely revised and corrected. The author also added a short section on moduli of elliptic curves with N-level structures. This new paragraph anticipates some of the techniques of volume II.

Compact Riemann Surfaces and Algebraic Curves Kichoon Yang 1988 This volume is an introduction to the theory of Compact Riemann Surfaces and algebraic curves. It gives a concise account of the elementary aspects of different viewpoints in curve theory. Foundational results on divisors and compact Riemann surfaces are also stated and proved.

Handbook of Teichmüller Theory Athanase

Papadopoulos 2007 This multi-volume set deals with Teichmuller theory in the broadest sense, namely, as the study of moduli space of geometric structures on surfaces, with methods inspired or adapted from those of classical Teichmuller theory. The aim is to give a complete panorama of this generalized Teichmuller theory and of its applications in various fields of mathematics. The volumes consist of chapters, each of which is dedicated to a specific topic. The volume has 19 chapters and is divided into four parts: The metric and the analytic theory (uniformization, Weil-Petersson geometry, holomorphic families of Riemann surfaces, infinite-dimensional Teichmuller spaces, cohomology of moduli space, and the intersection theory of moduli space). The group theory (quasi-homomorphisms of mapping class groups, measurable rigidity of mapping class groups, applications to Lefschetz fibrations, affine groups of flat surfaces, braid groups, and Artin groups). Representation spaces and geometric structures (trace coordinates, invariant theory, complex projective structures, circle packings, and moduli spaces of Lorentz manifolds homeomorphic to the product of a surface with the real line). The Grothendieck-Teichmuller theory (dessins d'enfants, Grothendieck's reconstruction principle, and the Teichmuller theory of the solenoid). This handbook is an essential reference for graduate students and researchers interested in Teichmuller theory and its ramifications, in particular for mathematicians working in topology, geometry, algebraic geometry, dynamical systems and complex analysis. The authors are leading experts in the field.

Geometrical Methods for the Theory of Linear Systems C.I. Byrnes 2012-12-06 The lectures contained in this book were presented at Harvard University in June 1979. The workshop at which they were presented was the third such on algebro-geometric methods. The first was held in 1973 in London and the emphasis was largely on geometric methods. The second was held at Ames Research Center-NASA in 1976. There again the emphasis was on geometric methods, but algebraic geometry was becoming a dominant theme. In the two years after the Ames meeting there was tremendous growth in the applications of algebraic geometry to systems theory and it was becoming clear that much of the algebraic systems theory was very closely related to the geometric systems theory. On this basis we felt that this was the right time to devote a workshop to the applications of algebra and algebraic geometry to linear systems theory. The lectures contained in this volume represent all but one of the tutorial lectures presented at the workshop. The lec ture of Professor Murray Wonham is not contained in this volume and we refer the interested to the archival literature. This workshop was jointly sponsored by a grant from Ames Research Center-NASA and a grant from the Advanced Study Institute Program of NATO. We greatly appreciate the financial support rendered by these two organizations. The American Mathematical Society hosted this meeting as part of their Summer Seminars in Applied Mathematics and will publish the companion volume of con tributed papers.

Rigid Analytic Geometry and Its Applications Jean Fresnel 2012-12-06 Rigid (analytic) spaces were invented to describe degenerations, reductions, and moduli of algebraic curves and abelian varieties. This work, a revised and greatly expanded new English edition of an earlier French text by the same authors, presents important new developments and applications of the theory of rigid analytic spaces to abelian varieties, "points of rigid spaces," étale cohomology, Drinfeld modular curves, and Monsky-Washnitzer cohomology. The exposition is concise, self-contained, rich in examples and exercises, and will serve as an excellent graduate-level text for the classroom or for self-study.

Selected Papers of Yu I Manin Yu I Manin 1996-06-28 The book is a collection of research and review articles in several areas of modern mathematics and mathematical physics published in the span of three decades. The ICM Kyoto talk “Mathematics as Metaphor” summarises the author's view on mathematics as an outgrowth of natural language. Contents:Algebraic Geometry:The Hasse-Witt Matrix of an Algebraic CurveRational Points of Algebraic Curves over Functional FieldsCorrespondences, Motives, and Monoidal TransformationsNew Directions in GeometryArrangements of Hyperplanes, Higher

Braid Groups and Higher Bruhat OrdersModular Forms and Diophantine Equations:The p-Torsion of Elliptic Curves is Uniformly BoundedParabolic Points and Zeta-Functions of Modular CurvesPeriods of p-Adic Schottky GroupsRational Points of Bounded Height on Fano VarietiesPoints of Bounded Height on del Pezzo SurfacesDifferential Equations and Mathematical Physics:Conservation Laws and Lax Representation of Benney's Long Wave EquationsGelfand–Dikii Hamiltonian Operator and the Coadjoint Representation of the Volterra GroupThe Twistor Transformation and Algebraic–Geometric Constructions of Solutions of the Equations of Field TheoryThe Mumford Form and the Polyakov Measure in String Theoryand other papers Readership: Mathematicians and mathematical physicists. keywords:Mathematical Physics;Algebraic Geometry;Hasse-Witt Matrix;Algebraic Curve;Rational Points;Hyperplanes;Higher Braid Groups;Higher Bruhat Orders;Modular Forms;Diophantine Equations;Parabolic Points;Zeta-Functions;p-Adic Schottky Groups;Del Pezzo Surfaces;Conservation Laws;Lax Representation;Benney's Long Wave Equations;Gelfand-Dikii Hamiltonian Operator;Volterra Group;Twistor Transformation;Mumford Form;Polyakov Measure;String Theory

Elliptic Curves Anthony W. Knapp 1992 An elliptic curve is a particular kind of cubic equation in two variables whose projective solutions form a group. Modular forms are analytic functions in the upper half plane with certain transformation laws and growth properties. The two subjects--elliptic curves and modular forms--come together in Eichler-Shimura theory, which constructs elliptic curves out of modular forms of a special kind. The converse, that all rational elliptic curves arise this way, is called the Taniyama-Weil Conjecture and is known to imply Fermat's Last Theorem. Elliptic curves and the modeular forms in the Eichler- Shimura theory both have associated L functions, and it is a consequence of the theory that the two kinds of L functions match. The theory covered by Anthony Knapp in this book is, therefore, a window into a broad expanse of mathematics--including class field theory, arithmetic algebraic geometry, and group representations--in which the concidence of L functions relates analysis and algebra in the most fundamental ways. Developing, with many examples, the elementary theory of elliptic curves, the book goes on to the subject of modular forms and the first connections with elliptic curves. The last two chapters concern Eichler-Shimura theory, which establishes a much deeper relationship between the two subjects. No other book in print treats the basic theory of elliptic curves with only undergraduate mathematics, and no other explains Eichler-Shimura theory in such an accessible manner.

Meromorphic Functions and Projective Curves Kichoon Yang 2013-11-27 This book contains an exposition of the theory of meromorphic functions and linear series on a compact Riemann surface. Thus the main subject matter consists of holomorphic maps from a compact Riemann surface to complex projective space. Our emphasis is on families of meromorphic functions and holomorphic curves. Our approach is more geometric than algebraic along the lines of [Griffiths-Harrisl]. AIso, we have relied on the books [Namba] and [Arbarello-Cornalba-Griffiths-Harris] to agreat exten- nearly every result in Chapters 1 through 4 can be found in the union of these two books. Our primary motivation was to understand the totality of meromorphic functions on an algebraic curve. Though this is a classical subject and much is known about meromorphic functions, we felt that an accessible exposition was lacking in the current literature. Thus our book can be thought of as a modest effort to expose parts of the known theory of meromorphic functions and holomorphic curves with a geometric bent. We have tried to make the book self-contained and concise which meant that several major proofs not essential to further development of the theory had to be omitted. The book is targeted at the non-expert who wishes to leam enough about meromorphic functions and holomorphic curves so that helshe will be able to apply the results in hislher own research. For example, a differential geometer working in minimal surface theory may want to tind out more about the distribution pattern of poles and zeros of a meromorphic function.

An Introduction to Algebraic Geometry Kenji Ueno 1997 This introduction to algebraic

geometry allows readers to grasp the fundamentals of the subject with only linear algebra and calculus as prerequisites. After a brief history of the subject, the book introduces projective spaces and projective varieties, and explains plane curves and resolution of their singularities. The volume further develops the geometry of algebraic curves and treats congruence zeta functions of algebraic curves over a finite field. It concludes with a complex analytical discussion of algebraic curves. The author emphasizes computation of concrete examples rather than proofs, and these examples are discussed from various viewpoints. This approach allows readers to develop a deeper understanding of the theorems.

Algebraic Curves and Their Applications Lubjana Beshaj 2019-02-26 This volume contains a collection of papers on algebraic curves and their applications. While algebraic curves traditionally have provided a path toward modern algebraic geometry, they also provide many applications in number theory, computer security and cryptography, coding theory, differential equations, and more. Papers cover topics such as the rational torsion points of elliptic curves, arithmetic statistics in the moduli space of curves, combinatorial descriptions of semistable hyperelliptic curves over local fields, heights on weighted projective spaces, automorphism groups of curves, hyperelliptic curves, dessins d'enfants, applications to Painlevé equations, descent on real algebraic varieties, quadratic residue codes based on hyperelliptic curves, and Abelian varieties and cryptography. This book will be a valuable resource for people interested in algebraic curves and their connections to other branches of mathematics.

Algebraic Curves Maxim E. Kazaryan 2019-01-21 This book offers a concise yet thorough introduction to the notion of moduli spaces of complex algebraic curves. Over the last few decades, this notion has become central not only in algebraic geometry, but in mathematical physics, including string theory, as well. The book begins by studying individual smooth algebraic curves, including the most beautiful ones, before addressing families of curves. Studying families of algebraic curves often proves to be more efficient than studying individual curves: these families and their total spaces can still be smooth, even if there are singular curves among their members. A major discovery of the 20th century, attributed to P. Deligne and D. Mumford, was that curves with only mild singularities form smooth compact moduli spaces. An unexpected byproduct of this discovery was the realization that the analysis of more complex curve singularities is not a necessary step in understanding the geometry of the moduli spaces. The book does not use the sophisticated machinery of modern algebraic geometry, and most classical objects related to curves – such as Jacobian, space of holomorphic differentials, the Riemann-Roch theorem, and Weierstrass points – are treated at a basic level that does not require a profound command of algebraic geometry, but which is sufficient for extending them to vector bundles and other geometric objects associated to moduli spaces. Nevertheless, it offers clear information on the construction of the moduli spaces, and provides readers with tools for practical operations with this notion. Based on several lecture courses given by the authors at the Independent University of Moscow and Higher School of Economics, the book also includes a wealth of problems, making it suitable not only for individual research, but also as a textbook for undergraduate and graduate coursework