Algebraic Groups James Milne

This volume consolidates selected articles from the 2016 Apprenticeship Program at the Fields Institute, part of the larger program on Combinatorial Algebraic Geometry that ran from July through December of 2016. Written primarily by junior mathematicians, the articles cover a range of topics in combinatorial algebraic geometry including curves, surfaces, Grassmannians, convexity, abelian varieties, and moduli spaces. This book bridges the gap between graduate courses and cutting-edge research by connecting historical sources, computation, explicit examples, and new results.

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.

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This book presents a comprehensive introduction to the theory of separable algebras over commutative rings. After a thorough introduction to the general theory, the fundamental roles played by separable algebras are explored. For example, Azumaya algebras, the henselization of local rings, and Galois theory are rigorously introduced and treated. Interwoven throughout these applications is the important notion of étale algebras. Essential connections are drawn between the theory of separable algebras and Morita theory, the theory of faithfully flat descent, cohomology, derivations, differentials, reflexive lattices, maximal orders, and class groups. The text is accessible to graduate students who have finished a first course in algebra, and it includes necessary foundational material, useful exercises, and many nontrivial examples.

??:Basic algebra. -- ??: W. H. Freeman, 1974

This book is a collection of articles on Abelian varieties and number theory dedicated to Gerhard Frey's 75th birthday. It contains original articles by experts in the area of arithmetic and algebraic geometry. The articles cover topics on Abelian varieties and finitely generated Galois groups, ranks of Abelian varieties and Mordell-Lang conjecture, Tate-Shafarevich group and isogeny volcanoes, endomorphisms of superelliptic Jacobians, obstructions to local-global principles over semi-global fields, Drinfeld modular varieties, representations of etale fundamental groups and specialization of algebraic cycles, Deuring's theory of constant reductions, etc. The book will be a valuable resource to graduate students and experts working on Abelian varieties and related areas.

The author defines and constructs mixed Hodge structures on real schematic homotopy types of complex quasi-projective varieties, giving mixed Hodge structures on their homotopy groups and pro-algebraic fundamental groups. The author also shows that these split on tensoring with the ring R[x] equipped with the Hodge filtration given by powers of (x?i), giving new results even for simply connected varieties. The mixed Hodge structures can thus be recovered from the Gysin spectral sequence of cohomology groups of local systems, together with the monodromy action at the Archimedean place. As the basepoint varies, these structures all become real variations of mixed Hodge structure.

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The authors determine the number of level 1, polarized, algebraic regular, cuspidal automorphic representations of GLn over Q of any given infinitesimal character, for essentially all n?8. For this, they compute the dimensions of spaces of level 1 automorphic forms for certain semisimple Z-forms of the compact groups SO7, SO8, SO9 (and G2) and determine Arthur's endoscopic partition of these spaces in all cases. They also give applications to the 121 even lattices of rank 25 and determinant 2 found by Borcherds, to level one self-dual automorphic representations of GLn with trivial infinitesimal character, and to vector valued Siegel modular forms of genus 3. A part of the authors' results are conditional to certain expected results in the theory of twisted endoscopy.

This volume contains the proceedings of the conference Dynamics: Topology and Numbers, held from July 2–6, 2018, at the Max Planck

Institute for Mathematics, Bonn, Germany.? The papers cover diverse fields of mathematics with a unifying theme of relation to dynamical systems. These include arithmetic geometry, flat geometry, complex dynamics, graph theory, relations to number theory, and topological dynamics. The volume is dedicated to the memory of Sergiy Kolyada and also contains some personal accounts of his life and mathematics.
One of the most important mathematical achievements of the past several decades has been A. Grothendieck's work on algebraic geometry. In the early 1960s, he and M. Artin introduced étale cohomology in order to extend the methods of sheaf-theoretic cohomology from complex varieties to more general schemes. This work found many applications, not only in algebraic geometry, but also in several different branches of number theory and in the representation theory of finite and p-adic groups. Yet until now, the work has been available only in the original massive and difficult papers. In order to provide an accessible introduction to étale cohomology, J. S. Milne offers this more elementary account covering the essential features of the theory. The author begins with a review of the basic properties of flat and étale morphisms and of the algebraic fundamental group. The next two chapters concern the basic theory of étale sheaves and elementary étale cohomology, and are followed by an application of the cohomology to the study of the Brauer group. After a detailed analysis of the cohomology of curves and surfaces, Professor Milne proves the fundamental theorems in étale cohomology -- those of base change, purity, Poincaré duality, and the Lefschetz trace formula. He then applies these theorems to show the rationality of some very general L-series. Originally published in 1980. The Princeton Legacy Library uses the latest print-on-demand technology to again make available previously out-of-print books from the distinguished backlist of Princeton University Press. These editions preserve the original texts of these important books while presenting them in durable paperback and hardcover editions. The goal of the Princeton Legacy Library is to vastly increase access to the rich scholarly heritage found in the thousands of books published by Princeton University Press since its founding in 1905.
The Grothendieck–Teichmüller group was defined by Drinfeld in quantum group theory with insights coming from the Grothendieck program in Galois theory. The ultimate goal of this book is to explain that this group has a topological interpretation as a group of homotopy automorphisms associated to the operad of little 2-discs, which is an object used to model commutative homotopy structures in topology. This volume gives a comprehensive survey on the algebraic aspects of this subject. The book explains the definition of an operad in a general context, reviews the definition of the little discs operads, and explains the definition of the Grothendieck–Teichmüller group from the viewpoint of the theory of operads. In the course of this study, the relationship between the little discs operads and the definition of universal operations associated to braided monoidal category structures is explained. Also provided is a comprehensive and self-contained survey of the applications of Hopf algebras to the definition of a rationalization process, the Malcev completion, for groups and groupoids. Most definitions are carefully reviewed in the book; it requires minimal prerequisites to be accessible to a broad readership of graduate students and researchers interested in the applications of operads.
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These six volumes include approximately 20,000 reviews of items in number theory that appeared in Mathematical Reviews between 1984 and 1996. This is the third such set of volumes in number theory. The first was edited by W.J. LeVeque and included reviews from 1940-1972; the second was edited by R.K. Guy and appeared in 1984.
Issue for Mar. 1970 dedicated to Professor Katuzi Ono on his 60th birthday with portrait, sketch of his life, and list of mathematical papers
????:Real and abstract analysis
A step-by-step guide to Langlands' early work leading up the Langlands Program for mathematicians and advanced students.

Ever since the concepts of Galois groups in algebra and fundamental groups in topology emerged during the nineteenth century, mathematicians have known of the strong analogies between the two concepts. This book presents the connection starting at an elementary level, showing how the judicious use of algebraic geometry gives access to the powerful interplay between algebra and topology that underpins much modern research in geometry and number theory. Assuming as little technical background as possible, the book starts with basic algebraic and topological concepts, but already presented from the modern viewpoint advocated by Grothendieck. This enables a systematic yet accessible development of the theories of fundamental groups of algebraic curves, fundamental groups of schemes, and Tannakian fundamental groups. The connection between fundamental groups and linear differential equations is also developed at increasing levels of generality. Key applications and recent results, for example on the inverse Galois problem, are given throughout.
The contributions in this book explore various contexts in which the derived category of coherent sheaves on a variety determines some of its arithmetic. This setting provides new geometric tools for interpreting elements of the Brauer group. With a view towards future arithmetic applications, the book extends a number of powerful tools for analyzing rational points on elliptic curves, e.g., isogenies among curves, torsion points, modular curves, and the resulting descent techniques, as well as higher-dimensional varieties like K3 surfaces. Inspired by the rapid recent advances in our understanding of K3 surfaces, the book is intended to foster cross-pollination between the fields of complex algebraic geometry and number theory. Contributors: · Nicolas Addington · Benjamin Antieau · Kenneth Ascher · Asher Auel · Fedor Bogomolov · Jean-Louis Colliot-Thélène · Krishna Dasaratha · Brendan Hassett · Colin Ingalls · Martí Lahoz · Emanuele Macrì · Kelly McKinnie · Andrew Obus · Ekin Ozman · Raman Parimala · Alexander Perry · Alena Pirutka · Justin Sawon · Alexei N. Skorobogatov · Paolo Stellari · Sho Tanimoto · Hugh Thomas · Yuri Tschinkel · Anthony Várilly-Alvarado · Bianca Viray · Rong Zhou
This volume contains the proceedings of an NSF/Conference Board of the Mathematical Sciences (CBMS) regional conference on Hodge theory, complex geometry, and representation theory, held on June 18, 2012, at the Texas Christian University in Fort Worth, TX. Phillip Griffiths, of the Institute for Advanced Study, gave 10 lectures describing now-classical work concerning how the structure of Shimura varieties as quotients of Mumford-Tate domains by arithmetic groups had been used to understand the relationship between Galois representations and automorphic forms. He then discussed recent breakthroughs of Carayol that provide the possibility of extending these results beyond the classical case. His lectures will appear as an independent volume in the CBMS series published by the AMS. This volume, which is dedicated to Phillip Griffiths, contains carefully written expository and research articles. Expository papers include discussions of Noether-Lefschetz theory, algebraicity of Hodge loci, and the representation theory of SL2(R). Research articles concern the Hodge conjecture, Harish-Chandra modules, mirror symmetry, Hodge representations of Q-algebraic groups, and compactifications, distributions, and quotients of period domains. It is expected that the book will be of interest primarily to research mathematicians, physicists, and upper-level graduate students.
This monograph on the homotopy theory of topologized diagrams of spaces and spectra gives an expert account of a subject at the foundation of motivic homotopy theory and the theory of topological modular forms in stable homotopy theory. Beginning with an introduction to the homotopy theory of simplicial sets and topos theory, the book covers core topics such as the unstable homotopy theory of simplicial presheaves and sheaves, localized theories, cocycles, descent theory, non-abelian cohomology, stacks, and local stable homotopy theory. A detailed treatment of the formalism of the subject is interwoven with explanations of the motivation, development, and nuances of ideas and results. The coherence of the abstract theory is elucidated through the use of widely applicable tools, such as Barr's theorem on Boolean

localization, model structures on the category of simplicial presheaves on a site, and cocycle categories. A wealth of concrete examples convey the vitality and importance of the subject in topology, number theory, algebraic geometry, and algebraic K-theory. Assuming basic knowledge of algebraic geometry and homotopy theory, Local Homotopy Theory will appeal to researchers and advanced graduate students seeking to understand and advance the applications of homotopy theory in multiple areas of mathematics and the mathematical sciences.
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.
This volume contains the proceedings of the 2015 Clifford Lectures on Algebraic Groups: Structures and Actions, held from March 2–5, 2015, at Tulane University, New Orleans, Louisiana. This volume consists of six articles on algebraic groups, including an enhanced exposition of the classical results of Chevalley and Rosenlicht on the structure of algebraic groups; an enhanced survey of the recently developed theory of pseudo-reductive groups; and an exposition of the recently developed operational -theory for singular varieties. In addition, there are three research articles containing previously unpublished foundational results on birational automorphism groups of algebraic varieties; solution of Hermite-Joubert problem over -closed fields; and cohomological invariants and applications to classifying spaces. The old and new results presented in these articles will hopefully become cornerstones for the future development of the theory of algebraic groups and applications. Graduate students and researchers working in the fields of algebraic geometry, number theory, and representation theory will benefit from this unique and broad compilation of fundamental results on algebraic group theory.
In honor of Serge Lang’s vast contribution to mathematics, this memorial volume presents articles by prominent mathematicians. Reflecting the breadth of Lang's own interests and accomplishments, these essays span the field of Number Theory, Analysis and Geometry.
In recent years, number theory and arithmetic geometry have been enriched by new techniques from noncommutative geometry, operator algebras, dynamical systems, and K-Theory. This volume collects and presents up-to-date research topics in arithmetic and noncommutative geometry and ideas from physics that point to possible new connections between the fields of number theory, algebraic geometry and noncommutative geometry. The articles collected in this volume present new noncommutative geometry perspectives on classical topics of number theory and arithmetic such as modular forms, class field theory, the theory of reductive p-adic groups, Shimura varieties, the local L-factors of arithmetic varieties. They also show how arithmetic appears naturally in noncommutative geometry and in physics, in the residues of Feynman graphs, in the properties of noncommutative tori, and in the quantum Hall effect.