Algebra Serge Lang

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Introduction to Algebraic and Abelian Functions Serge Lang 2012-12-06 Introduction to Algebraic and Abelian Functions is a self-contained presentation of a fundamental subject in algebraic geometry and number theory. For this revised edition, the material on theta functions has been expanded, and the example of the Fermat curves is carried throughout the text. This volume is geared toward a second-year graduate course, but it leads naturally to the study of more advanced books listed in the bibliography.

Algebraic Number Theory Serge Lang 2013-06-29 This is a second edition of Lang's well-known textbook. It covers all of the basic material of classical algebraic number theory, giving the student the background necessary for the study of further topics in algebraic number theory, such as cyclotomic fields, or modular forms. "Lang's books are always of great value for the graduate student and the research mathematician. This updated edition of Algebraic number theory is no exception."—-MATHEMATICAL REVIEWS

Geometry Serge Lang 2013-04-17 At last: geometry in an exemplary, accessible and attractive form! The authors emphasise both the intellectually stimulating parts of geometry and routine arguments or computations in concrete or classical cases, as well as practical and physical applications. They also show students the fundamental concepts and the

difference between important results and minor technical routines. Altogether, the text presents a coherent high school curriculum for the geometry course, naturally backed by numerous examples and exercises.
Undergraduate Algebra Serge Lang 2013-06-29 The companion title, Linear Algebra, has sold over 8,000 copies The writing style is very accessible The material can be covered easily in a one-year or one-term course Includes Noah Snyder's proof of the Mason-Stothers polynomial abc theorem New material included on product structure for matrices including descriptions of the conjugation representation of the diagonal group
Introduction to Algebraic Geometry Serge Lang 2019-03-20 Rapid, concise, self-contained introduction assumes only familiarity with elementary algebra. Subjects include algebraic varieties; products, projections, and correspondences; normal varieties; differential forms; theory of simple points; algebraic groups; more. 1958 edition.
Fundamentals of Diophantine Geometry S. Lang 2013-06-29 Diophantine problems represent some of the strongest aesthetic attractions to algebraic geometry. They consist in giving criteria for the existence of solutions of algebraic equations in rings and fields, and eventually for the number of such solutions. The fundamental ring of interest is the ring of ordinary integers Z, and the fundamental field of interest is the field Q of rational numbers. One discovers rapidly that to have all the technical freedom needed in handling general problems, one must consider rings and fields of finite type over the integers and rationals. Furthermore, one is led to consider also finite fields, p-adic fields (including the real and complex numbers) as representing a localization of the problems under consideration. We shall deal with global problems, all of which will be of a qualitative nature. On the one hand we have curves defined over say the rational numbers. Ifthe curve is affine one may ask for its points in Z, and thanks to Siegel, one can classify all curves which have infinitely many integral points. This problem is treated in Chapter VII. One may ask also for those which have infinitely many rational points, and for this, there is only Mordell's conjecture that if the genus is :;;; 2, then there is only a finite number of rational points.
Topics in Cohomology of Groups Serge Lang 2006-11-14 The book is a mostly translated reprint of a report on cohomology of groups from the 1950s and 1960s, originally written as background for the Artin-Tate notes on class field theory, following the cohomological approach. This report was first published (in French) by Benjamin. For this new English edition, the author added Tate's local duality, written up from letters which John Tate sent to Lang in 1958 - 1959. Except for this last item, which requires more substantial background in algebraic geometry and especially abelian varieties, the rest of the book is basically elementary, depending only on standard homological algebra at the level of first year graduate students.
Algebra Serge Lang 2005-06-21 This book is intended as a basic text for a one year course in algebra at the graduate

level or as a useful reference for mathematicians and professionals who use higher-level algebra. This book successfully addresses all of the basic concepts of algebra. For the new edition, the author has added exercises and made numerous corrections to the text. From MathSciNet's review of the first edition: "The author has an impressive knack for presenting the important and interesting ideas of algebra in just the "right" way, and he never gets bogged down in the dry formalism which pervades some parts of algebra."

Algebra: Chapter 0 Paolo Aluffi 2009 Algebra: Chapter 0 is a self-contained introduction to the main topics of algebra, suitable for a first sequence on the subject at the beginning graduate or upper undergraduate level. The primary distinguishing feature of the book, compared to standard textbooks in algebra, is the early introduction of categories, used as a unifying theme in the presentation of the main topics. A second feature consists of an emphasis on homological algebra: basic notions on complexes are presented as soon as modules have been introduced, and an extensive last chapter on homological algebra can form the basis for a follow-up introductory course on the subject. Approximately 1,000 exercises both provide adequate practice to consolidate the understanding of the main body of the text and offer the opportunity to explore many other topics, including applications to number theory and algebraic geometry. This will allow instructors to adapt the textbook to their specific choice of topics and provide the independent reader with a richer exposure to algebra. Many exercises include substantial hints, and navigation of the topics is facilitated by an extensive index and by hundreds of cross-references.

Linear Algebra Serge Lang 1987-01-26 "Linear Algebra" is intended for a one-term course at the junior or senior level. It begins with an exposition of the basic theory of vector spaces and proceeds to explain the fundamental structure theorem for linear maps, including eigenvectors and eigenvalues, quadratic and hermitian forms, diagnolization of symmetric, hermitian, and unitary linear maps and matrices, triangulation, and Jordan canonical form. The book also includes a useful chapter on convex sets and the finite-dimensional Krein-Milman theorem. The presentation is aimed at the student who has already had some exposure to the elementary theory of matrices, determinants and linear maps. However the book is logically self-contained. In this new edition, many parts of the book have been rewritten and reorganized, and new exercises have been added.

Differential Manifolds Serge Lang 2012-12-06 The present volume supersedes my Introduction to Differentiable Manifolds written a few years back. I have expanded the book considerably, including things like the Lie derivative, and especially the basic integration theory of differential forms, with Stokes' theorem and its various special formulations in different contexts. The foreword which I wrote in the earlier book is still quite valid and needs only slight extension here. Between advanced calculus and the three great differential theories (differential topology, differential geometry, ordinary differential

equations), there lies a no-man's-land for which there exists no systematic exposition in the literature. It is the purpose of this book to fill the gap. The three differential theories are by no means independent of each other, but proceed according to their own flavor. In differential topology, one studies for instance homotopy classes of maps and the possibility of finding suitable differentiable maps in them (immersions, embeddings, isomorphisms, etc.). One may also use differentiable structures on topological manifolds to determine the topological structure of the manifold (e.g. it la Smale [26]).
Riemann-Roch Algebra William Fulton 2013-03-14 In various contexts of topology, algebraic geometry, and algebra (e.g. group representations), one meets the following situation. One has two contravariant functors K and A from a certain category to the category of rings, and a natural transformation p:K--+A of contravariant functors. The Chern character being the central exam ple, we call the homomorphisms Px: K(X)--+ A(X) characters. Given f: X--+ Y, we denote the pull-back homomorphisms by and fA: A(Y)--+ A(X). As functors to abelian groups, K and A may also be covariant, with push-forward homomorphisms and fA: A(X)--+ A(Y). Usually these maps do not commute with the character, but there is an element r f E A(X) such that the following diagram is commutative: K(X)~A(X) fK j J~A K(Y) --p;-+ A(Y) The map in the top line is p x multiplied by r f. When such commutativity holds, we say that Riemann-Roch holds for f. This type of formulation was first given by Grothendieck, extending the work of Hirzebruch to such a relative, functorial setting. Since then viii INTRODUCTION several other theorems of this Riemann-Roch type have appeared. Un derlying most of these there is a basic structure having to do only with elementary algebra, independent of the geometry. One purpose of this monograph is to describe this algebra independently of any context, so that it can serve axiomatically as the need arises.
Introduction to Linear Algebra Serge Lang 2012-12-06 This is a short text in linear algebra, intended for a one-term course. In the first chapter, Lang discusses the relation between the geometry and the algebra underlying the subject, and gives concrete examples of the notions which appear later in the book. He then starts with a discussion of linear equations, matrices and Gaussian elimination, and proceeds to discuss vector spaces, linear maps, scalar products, determinants, and eigenvalues. The book contains a large number of exercises, some of the routine computational type, while others are conceptual.
Math! Serge Lang 2013-03-14
Undergraduate Algebra Serge Lang 1987
Calculus of Several Variables Serge Lang 2012-12-06 This new, revised edition covers all of the basic topics in calculus of several variables, including vectors, curves, functions of several variables, gradient, tangent plane, maxima and minima, potential functions, curve integrals, Green’s theorem, multiple integrals, surface integrals, Stokes’ theorem, and the

inverse mapping theorem and its consequences. It includes many completely worked-out problems.
Solutions Manual for Lang’s Linear Algebra Rami Shakarchi 1996-08-09 This solutions manual for Lang’s Undergraduate Analysis provides worked-out solutions for all problems in the text. They include enough detail so that a student can fill in the intervening details between any pair of steps.
Real and Functional Analysis Serge Lang 2012-12-06 This book is meant as a text for a first-year graduate course in analysis. In a sense, it covers the same topics as elementary calculus but treats them in a manner suitable for people who will be using it in further mathematical investigations. The organization avoids long chains of logical interdependence, so that chapters are mostly independent. This allows a course to omit material from some chapters without compromising the exposition of material from later chapters.
SL2(R) S. Lang 2012-12-06 SL2(R) gives the student an introduction to the infinite dimensional representation theory of semisimple Lie groups by concentrating on one example - SL2(R). This field is of interest not only for its own sake, but for its connections with other areas such as number theory, as brought out, for example, in the work of Langlands. The rapid development of representation theory over the past 40 years has made it increasingly difficult for a student to enter the field. This book makes the theory accessible to a wide audience, its only prerequisites being a knowledge of real analysis, and some differential equations.
Algebra 1993
A First Course in Calculus Serge Lang 2012-09-17 This fifth edition of Lang's book covers all the topics traditionally taught in the first-year calculus sequence. Divided into five parts, each section of A FIRST COURSE IN CALCULUS contains examples and applications relating to the topic covered. In addition, the rear of the book contains detailed solutions to a large number of the exercises, allowing them to be used as worked-out examples -- one of the main improvements over previous editions.
Abstract Algebra Paul B. Garrett 2007-09-25 Designed for an advanced undergraduate- or graduate-level course, Abstract Algebra provides an example-oriented, less heavily symbolic approach to abstract algebra. The text emphasizes specifics such as basic number theory, polynomials, finite fields, as well as linear and multilinear algebra. This classroom-tested, how-to manual takes a more narrative approach than the stiff formalism of many other textbooks, presenting coherent storylines to convey crucial ideas in a student-friendly, accessible manner. An unusual feature of the text is the systematic characterization of objects by universal mapping properties, rather than by constructions whose technical details are irrelevant. Addresses Common Curricular Weaknesses In addition to standard introductory material on the subject, such as Lagrange's and Sylow's theorems in group theory, the text provides important specific illustrations of general theory,

discussing in detail finite fields, cyclotomic polynomials, and cyclotomic fields. The book also focuses on broader background, including brief but representative discussions of naive set theory and equivalents of the axiom of choice, quadratic reciprocity, Dirichlet's theorem on primes in arithmetic progressions, and some basic complex analysis. Numerous worked examples and exercises throughout facilitate a thorough understanding of the material.

Complex Analysis Serge Lang 2013-06-29 The present book is meant as a text for a course on complex analysis at the advanced undergraduate level, or first-year graduate level. Somewhat more material has been included than can be covered at leisure in one term, to give opportunities for the instructor to exercise his taste, and lead the course in whatever direction strikes his fancy at the time. A large number of routine exercises are included for the more standard portions, and a few harder exercises of striking theoretical interest are also included, but may be omitted in courses addressed to less advanced students. In some sense, I think the classical German prewar texts were the best (Hurwitz-Courant, Knopp, Bieberbach, etc.) and I would recom mend to anyone to look through them. More recent texts have empha sized connections with real analysis, which is important, but at the cost of exhibiting succinctly and clearly what is peculiar about complex anal ysis: the power series expansion, the uniqueness of analytic continuation, and the calculus of residues. The systematic elementary development of formal and convergent power series was standard fare in the German texts, but only Cartan, in the more recent books, includes this material, which I think is quite essential, e. g. , for differential equations. I have written a short text, exhibiting these features, making it applicable to a wide variety of tastes. The book essentially decomposes into two parts.

Real Analysis Serge Lang 1983

Algebra Thomas W. Hungerford 2012-12-06 Finally a self-contained, one volume, graduate-level algebra text that is readable by the average graduate student and flexible enough to accommodate a wide variety of instructors and course contents. The guiding principle throughout is that the material should be presented as general as possible, consistent with good pedagogy. Therefore it stresses clarity rather than brevity and contains an extraordinarily large number of illustrative exercises.

Introduction to Algebraic Geometry Serge Lang 2019-03-20 Author Serge Lang defines algebraic geometry as the study of systems of algebraic equations in several variables and of the structure that one can give to the solutions of such equations. The study can be carried out in four ways: analytical, topological, algebraico-geometric, and arithmetic. This volume offers a rapid, concise, and self-contained introductory approach to the algebraic aspects of the third method, the algebraico-geometric. The treatment assumes only familiarity with elementary algebra up to the level of Galois theory. Starting with an opening chapter on the general theory of places, the author advances to examinations of algebraic varieties, the absolute theory of varieties, and products, projections, and correspondences. Subsequent chapters explore normal varieties, divisors and linear systems, differential forms, the theory of simple points, and algebraic groups, concluding with a focus on the Riemann-Roch theorem. All the theorems of a general nature related to the foundations of the theory of algebraic groups are featured.

Elements of Abstract Algebra Allan Clark 2012-07-06 Lucid coverage of the major theories of abstract algebra, with helpful illustrations and exercises included throughout. Unabridged, corrected republication of the work originally published 1971. Bibliography. Index. Includes 24 tables and figures.

Linear Algebra and Geometry Igor R. Shafarevich 2012-08-23 This book on linear algebra and geometry is based on a course given by renowned academician I.R. Shafarevich at Moscow State University. The book begins with the theory of linear algebraic equations and the basic elements of matrix theory and continues with vector spaces, linear transformations, inner product spaces, and the theory of affine and projective spaces. The book also includes some subjects that are naturally related to linear algebra but are usually not covered in such courses: exterior algebras, non-Euclidean geometry, topological properties of projective spaces, theory of quadrics (in affine and projective spaces), decomposition of finite abelian groups, and finitely generated periodic modules (similar to Jordan normal forms of linear operators). Mathematical reasoning, theorems, and concepts are illustrated with numerous examples from various fields of mathematics, including differential equations and differential geometry, as well as from mechanics and physics.

The Beauty of Doing Mathematics Serge Lang 2012-12-06 If someone told you that mathematics is quite beautiful, you might be surprised. But you should know that some people do mathematics all their lives, and create mathematics, just as a composer creates music. Usually, every time a mathematician solves a problem, this gives rise to many oth ers, new and just as beautiful as the one which was solved. Of course, often these problems are quite difficult, and as in other disciplines can be understood only by those who have studied the subject with some depth, and know the subject well. In 1981, Jean Brette, who is responsible for the Mathematics Section of the Palais de la Decouverte (Science Museum) in Paris, invited me to give a conference at the Palais. I had never given such a conference before, to a non-mathematical public. Here was a challenge: could I communicate to such a Saturday afternoon audience what it means to do mathematics, and why one does mathematics? By "mathematics" I mean pure mathematics. This doesn't mean that pure math is better than other types of math, but I and a number of others do pure mathematics, and it's about them that I am now concerned. Math has a bad reputation, stemming from the most elementary levels. The word is in fact used in many different contexts. First, I had to explain briefly these possible contexts, and the one with which I wanted to deal.

Abelian Varieties Serge Lang 2019-02-13 A basic advanced text in its field, this monograph for undergraduates and graduate students in mathematics requires some background in elementary qualitative algebraic geometry and the elementary theory of algebraic groups. 1959 edition.

Introduction to Arakelov Theory Serge Lang 1988-11-09 Arakelov introduced a component at infinity in arithmetic considerations, thus giving rise to global theorems similar to those of the theory of surfaces, but in an arithmetic context over the ring of integers of a number field. The book gives an introduction to this theory, including the analogues of the Hodge Index Theorem, the Arakelov adjunction formula, and the Faltings Riemann-Roch theorem. The book is intended for second year graduate students and researchers in the field who want a systematic introduction to the subject. The residue theorem, which forms the basis for the adjunction formula, is proved by a direct method due to Kunz and Waldi. The Faltings Riemann-Roch theorem is proved without assumptions of semistability. An effort has been made to include all necessary details, and as complete references as possible, especially to needed facts of analysis for Green's functions and the Faltings metrics.

Algebraic Structures Serge Lang 1967

Cyclotomic Fields I and II Serge Lang 2012-12-06 Kummer's work on cyclotomic fields paved the way for the development of algebraic number theory in general by Dedekind, Weber, Hensel, Hilbert, Takagi, Artin and others. However, the success of this general theory has tended to obscure special facts proved by Kummer about cyclotomic fields which lie deeper than the general theory. For a long period in the 20th century this aspect of Kummer's work seems to have been largely forgotten, except for a few papers, among which are those by Pollaczek [Po], Artin-Hasse [A-H] and Vandiver [Va]. In the mid 1950's, the theory of cyclotomic fields was taken up again by Iwasawa and Leopoldt. Iwasawa viewed cyclotomic fields as being analogues for number fields of the constant field extensions of algebraic geometry, and wrote a great sequence of papers investigating towers of cyclotomic fields, and more generally, Galois extensions of number fields whose Galois group is isomorphic to the additive group of p-adic integers. Leopoldt concentrated on a fixed cyclotomic field, and established various p-adic analogues of the classical complex analytic class number formulas. In particular, this led him to introduce, with Kubota, p-adic analogues of the complex L-functions attached to cyclotomic extensions of the rationals. Finally, in the late 1960's, Iwasawa [Iw 11] made the fundamental discovery that there was a close connection between his work on towers of cyclotomic fields and these p-adic L-functions of Leopoldt - Kubota.

Complex Multiplication S. Lang 2012-12-06 The small book by Shimura-Taniyama on the subject of complex multi is a classic. It gives the results obtained by them (and some by Weil) plication in the higher dimensional case, generalizing in a non-trivial way the method of Deuring for elliptic curves, by reduction mod p. Partly through the work of Shimura himself (cf. [Sh 1] [Sh 2], and [Sh 5]), and some others (Serre, Tate, Kubota, Ribet, Deligne etc.) it is possible today to make a

more snappy and extensive presentation of the fundamental results than was possible in 1961. Several persons have found my lecture notes on this subject useful to them, and so I have decided to publish this short book to make them more widely available. Readers acquainted with the standard theory of abelian varieties, and who wish to get rapidly an idea of the fundamental facts of complex multi plication, are advised to look first at the two main theorems, Chapter 3, §6 and Chapter 4, §1, as well as the rest of Chapter 4. The applications of Chapter 6 could also be profitably read early. I am much indebted to N. Schappacher for a careful reading of the manu script resulting in a number of useful suggestions. S. LANG Contents CHAPTER 1 Analytic Complex Multiplication 4 I. Positive Definite Involutions . . . 6 2. CM Types and Subfields. . . . . 8 3. Application to Abelian Manifolds. 4. Construction of Abelian Manifolds with CM 14 21 5. Reflex of a CM Type . . . . .
Algebra Serge Lang 2012-11-10 This book is intended as a basic text for a one year course in algebra at the graduate level or as a useful reference for mathematicians and professionals who use higher-level algebra. This book successfully addresses all of the basic concepts of algebra. For the new edition, the author has added exercises and made numerous corrections to the text. From MathSciNet's review of the first edition: "The author has an impressive knack for presenting the important and interesting ideas of algebra in just the "right" way, and he never gets bogged down in the dry formalism which pervades some parts of algebra."
Basic Mathematics Serge Lang 1988-01
Algebraic Geometry Solomon Lefschetz 2015-12-08 The first application of modern algebraic techniques to a comprehensive selection of classical geometric problems. Written with spirit and originality, this is a valuable book for anyone interested in the subject from other than the purely algebraic point of view. Originally published in 1953. 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.
Algebra Serge A. Lang 1993 This basic text for a one-year course in algebra at the graduate level thoroughly prepares students to handle the algebra they will use in all of mathematics. The author assumes that students have a basic familiarity with the language of mathematics "i.e.: sets and mapping, integers, and rational numbers." The text was thoroughly revised and enhanced in response to reviewers' comments and suggestions. Designed to improve students' retention and comprehension, the text is divided into four parts. The first introduces the basic notions of algebra. The

second covers the direction of algebraic equations, including the Galois theory, and the final two parts cover the direction of linear and multilinear algebra.

Algebra Serge Lang 1978

Algebraic Number Theory Ian Stewart 1979-05-31 The title of this book may be read in two ways. One is 'algebraic number-theory', that is, the theory of numbers viewed algebraically; the other, 'algebraic-number theory', the study of algebraic numbers. Both readings are compatible with our aims, and both are perhaps misleading. Misleading, because a proper coverage of either topic would require more space than is available, and demand more of the reader than we wish to; compatible, because our aim is to illustrate how some of the basic notions of the theory of algebraic numbers may be applied to problems in number theory. Algebra is an easy subject to compartmentalize, with topics such as 'groups', 'rings' or 'modules' being taught in comparative isolation. Many students view it this way. While it would be easy to exaggerate this tendency, it is not an especially desirable one. The leading mathematicians of the nineteenth and early twentieth centuries developed and used most of the basic results and techniques of linear algebra for perhaps a hundred years, without ever defining an abstract vector space: nor is there anything to suggest that they suf fered thereby. This historical fact may indicate that abstrac tion is not always as necessary as one commonly imagines; on the other hand the axiomatization of mathematics has led to enormous organizational and conceptual gains.