Graduate Texts in Mathematics

Henri Cohen

A Course in Computational Algebraic Number Theory

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Course In Computational Algebraic Number

Ezra Miller,Bernd Sturmfels

Course In Computational Algebraic Number:

A Course in Computational Algebraic Number Theory Henri Cohen,1993 Describes 148 algorithms that are fundamental for number theoretic computations including computations related to algebraic number theory elliptic curves primality testing and factoring A complete theoretical introduction is given for each subject reducing prerequisites to a minimum The detailed description of each algorithm allows immediate *A Course in Computational Algebraic Number Theory* Henri Cohen,2013-04-17 With the advent of powerful computing tools and numerous advances in math ematics computer science and cryptography algorithmic number theory has become an important subject in its own right Both external and internal pressures gave a powerful impetus to the development of more powerful al gorithms These in turn led to a large number of spectacular breakthroughs To mention but a few the LLL algorithm which has a wide range of appli cations including real world applications to integer programming primality testing and factoring algorithms sub exponential class group and regulator algorithms etc Several books exist which treat parts of this subject It is essentially impossible for an author to keep up with the rapid pace of progress in all areas of this subject Each book emphasizes a different area corresponding to the author s tastes and interests The most famous but unfortunately the oldest is Knuth s Art of Computer Programming especially Chapter 4 The present book has two goals First to give a reasonably comprehensive introductory course in computational number theory In particular although we study some subjects in great detail others are only mentioned but with suitable pointers to the literature Hence we hope that this book can serve as a first course on the subject A natural sequel would be to study more specialized subjects in the existing literature *COURSE IN COMPUTATIONAL ALGEBRAIC NUMBER THEORY* ,1993 **Fermat's Last Theorem** Harold M. Edwards,2000-01-14 This introduction to algebraic number theory via the famous problem of Fermats Last Theorem follows its historical development beginning with the work of Fermat and ending with Kummers theory of ideal factorization The more elementary topics such as Eulers proof of the impossibilty of x y z are treated in an uncomplicated way and new concepts and techniques are introduced only after having been motivated by specific problems The book also covers in detail the application of Kummers theory to quadratic integers and relates this to Gauss theory of binary quadratic forms an interesting and important connection that is not explored in any other book **The LLL Algorithm** Phong Q. Nguyen,Brigitte Vallée,2009-12-02 The first book to offer a comprehensive view of the LLL algorithm this text surveys computational aspects of Euclidean lattices and their main applications It includes many detailed motivations explanations and examples Computational Algebra and Number Theory Wieb Bosma,Alf van der Poorten,2013-03-09 Computers have stretched the limits of what is possible in mathematics More they have given rise to new fields of mathematical study the analysis of new and traditional algorithms the creation of new paradigms for implementing computational methods the viewing of old techniques from a concrete algorithmic vantage point to name but a few Computational Algebra and Number Theory lies at the lively intersection of computer science and mathematics It

highlights the surprising width and depth of the field through examples drawn from current activity ranging from category theory graph theory and combinatorics to more classical computational areas such as group theory and number theory Many of the papers in the book provide a survey of their topic as well as a description of present research Throughout the variety of mathematical and computational fields represented the emphasis is placed on the common principles and the methods employed Audience Students experts and those performing current research in any of the topics mentioned above

Algorithmic Number Theory Claus Fieker,David R. Kohel,2003-08-02 This book constitutes the refereed proceedings of the 5th International Algorithmic Number Theory Symposium ANTS V held in Sydney Australia in July 2002 The 34 revised full papers presented together with 5 invited papers have gone through a thorough round of reviewing selection and revision The papers are organized in topical sections on number theory arithmetic geometry elliptic curves and CM point counting cryptography function fields discrete logarithms and factoring Groebner bases and complexity *Number Theory for the Millennium III* Bruce Berndt,M.A. Bennett,N. Boston,H.G. Diamond,A.J. Hildebrand,W. Phillpp,2023-03-17 Building on the tradition of an outstanding series of conferences at the University of Illinois at Urbana Champaign the organizers attracted an international group of scholars to open the new Millennium with a conference that reviewed the current state of number theory research and pointed to future directions in the field The conference was the largest general number theory conference in recent history featuring a total of 159 talks with the plenary lectures given by George Andrews Jean Bourgain Kevin Ford Ron Graham Andrew Granville Roger Heath Brown Christopher Hooley Winnie Li Kumar Murty Mel Nathanson Ken Ono Carl Pomerance Bjorn Poonen Wolfgang Schmidt Chris Skinner K Soundararajan Robert Tijdeman Robert Vaughan and Hugh Williams The Proceedings Volumes of the conference review some of the major number theory achievements of this century and to chart some of the directions in which the subject will be heading during the new century These volumes will serve as a useful reference to researchers in the area and an introduction to topics of current interest in number theory for a general audience in mathematics **Public-Key Cryptography and Computational Number Theory** Kazimierz Alster,Jerzy Urbanowicz,Hugh C. Williams,2011-06-24 The Proceedings contain twenty selected refereed contributions arising from the International Conference on Public Key Cryptography and Computational Number Theory held in Warsaw Poland on September 11 15 2000 The conference attended by eightyfive mathematicians from eleven countries was organized by the Stefan Banach International Mathematical Center This volume contains articles from leading experts in the world on cryptography and computational number theory providing an account of the state of research in a wide variety of topics related to the conference theme It is dedicated to the memory of the Polish mathematicians Marian Rejewski 1905 1980 Jerzy R ycki 1909 1942 and Henryk Zygalski 1907 1978 who deciphered the military version of the famous Enigma in December 1932 January 1933 A noteworthy feature of the volume is a foreword written by Andrew Odlyzko on the progress in cryptography from Enigma time until now **Advanced Linear Algebra** Steven Roman,2007-09-20 For the third edition

the author has added a new chapter on associative algebras that includes the well known characterizations of the finite dimensional division algebras over the real field a theorem of Frobenius and over a finite field Wedderburn s theorem polished and refined some arguments such as the discussion of reflexivity the rational canonical form best approximations and the definitions of tensor products upgraded some proofs that were originally done only for finite dimensional rank cases added new theorems including the spectral mapping theorem corrected all known errors the reference section has been enlarged considerably with over a hundred references to books on linear algebra From the reviews of the second edition In this 2nd edition the author has rewritten the entire book and has added more than 100 pages of new materials As in the previous edition the text is well written and gives a thorough discussion of many topics of linear algebra and related fields the exercises are rewritten and expanded Overall I found the book a very useful one It is a suitable choice as a graduate text or as a reference book Ali Akbar Jafarian ZentralblattMATH This is a formidable volume a compendium of linear algebra theory classical and modern The development of the subject is elegant The proofs are neat The exercise sets are good with occasional hints given for the solution of trickier problems It represents linear algebra and does so comprehensively Henry Ricardo MathDL *Algebraic Graph Theory* Chris Godsil,Gordon F. Royle,2013-12-01 This book presents and illustrates the main tools and ideas of algebraic graph theory with a primary emphasis on current rather than classical topics It is designed to offer self contained treatment of the topic with strong emphasis on concrete examples **Algorithmic Number Theory** Wieb Bosma,2006-12-30 This book constitutes the refereed proceedings of the 4th International Algorithmic Number Theory Symposium ANTS IV held in Leiden The Netherlands in July 2000 The book presents 36 contributed papers which have gone through a thorough round of reviewing selection and revision Also included are 4 invited survey papers Among the topics addressed are gcd algorithms primality factoring sieve methods cryptography linear algebra lattices algebraic number fields class groups and fields elliptic curves polynomials function fields and power sums **Algebraic Groups and Class Fields** Jean-Pierre Serre,2012-12-06 Translation of the French Edition **Basic Homological Algebra** M. Scott Osborne,2000-05-19 From the reviews The book is well written We find here many examples Each chapter is followed by exercises and at the end of the book there are outline solutions to some of them I especially appreciated the lively style of the book one is quickly able to find necessary details EMS Newsletter **Algebraic Geometry** Robin Hartshorne,2013-06-29 Robin Hartshorne studied algebraic geometry with Oscar Zariski and David Mumford at Harvard and with J P Serre and A Grothendieck in Paris After receiving his Ph D from Princeton in 1963 Hartshorne became a Junior Fellow at Harvard then taught there for several years In 1972 he moved to California where he is now Professor at the University of California at Berkeley He is the author of Residues and Duality 1966 Foundations of Projective Geometry 1968 Ample Subvarieties of Algebraic Varieties 1970 and numerous research titles His current research interest is the geometry of projective varieties and vector bundles He has been a visiting professor at the College de France and at Kyoto University where he gave lectures

in French and in Japanese respectively Professor Hartshorne is married to Edie Churchill educator and psychotherapist and has two sons He has travelled widely speaks several foreign languages and is an experienced mountain climber He is also an accomplished amateur musician he has played the flute for many years and during his last visit to Kyoto he began studying the shakuhachi Combinatorial Commutative Algebra Ezra Miller,Bernd Sturmfels,2005-06-21 Recent developments are covered Contains over 100 figures and 250 exercises Includes complete proofs *Analysis for Applied Mathematics* Ward Cheney,2013-04-17 This book evolved from a course at our university for beginning graduate stu dents in mathematics particularly students who intended to specialize in ap plied mathematics The content of the course made it attractive to other math ematics students and to graduate students from other disciplines such as en gineering physics and computer science Since the course was designed for two semesters duration many topics could be included and dealt with in de tail Chapters 1 through 6 reflect roughly the actual nature of the course as it was taught over a number of years The content of the course was dictated by a syllabus governing our preliminary Ph D examinations in the subject of ap plied mathematics That syllabus in turn expressed a consensus of the faculty members involved in the applied mathematics program within our department The text in its present manifestation is my interpretation of that syllabus my colleagues are blameless for whatever flaws are present and for any inadvertent deviations from the syllabus The book contains two additional chapters having important material not included in the course Chapter 8 on measure and integration is for the ben efit of readers who want a concise presentation of that subject and Chapter 7 contains some topics closely allied but peripheral to the principal thrust of the course This arrangement of the material deserves some explanation A Course in the Theory of Groups Derek J.S. Robinson,2012-12-06 A group is defined by means of the laws of combinations of its symbols according to a celebrated dictum of Cayley And this is probably still as good a one line explanation as any The concept of a group is surely one of the central ideas of mathematics Certainly there are a few branches of that science in which groups are not employed implicitly or explicitly Nor is the use of groups confined to pure mathematics Quantum theory molecular and atomic structure and crystallography are just a few of the areas of science in which the idea of a group as a measure of symmetry has played an important part The theory of groups is the oldest branch of modern algebra Its origins are to be found in the work of Joseph Louis Lagrange 1736 1813 Paulo Ruffini 1765 1822 and Evariste Galois 1811 1832 on the theory of algebraic equations Their groups consisted of permutations of the variables or of the roots of polynomials and indeed for much of the nineteenth century all groups were finite permutation groups Nevertheless many of the fundamental ideas of group theory were introduced by these early workers and their successors Augustin Louis Cauchy 1789 1857 Ludwig Sylow 1832 1918 Camille Jordan 1838 1922 among others The concept of an abstract group is clearly recognizable in the work of Arthur Cayley 1821 1895 but it did not really win widespread acceptance until Walther von Dyck 1856 1934 introduced presentations of groups

Algebra Thomas W. Hungerford,2012-12-06 Algebra fulfills a definite need to provide a self contained one volume

graduate level algebra text that is readable by the average graduate student and flexible enough to accomodate a wide variety of instructors and course contents The guiding philosophical principle throughout the text is that the material should be presented in the maximum usable generality consistent with good pedagogy Therefore it is essentially self contained stresses clarity rather than brevity and contains an unusually large number of illustrative exercises The book covers major areas of modern algebra which is a necessity for most mathematics students in sufficient breadth and depth

Computational Algebraic Number Theory M.E. Pohst,2012-12-06 Computational algebraic number theory has been attracting broad interest in the last few years due to its potential applications in coding theory and cryptography For this reason the Deutsche Mathematiker Vereinigung initiated an introductory graduate seminar on this topic in D sseldorf The lectures given there by the author served as the basis for this book which allows fast access to the state of the art in this area Special emphasis has been placed on practical algorithms all developed in the last five years for the computation of integral bases the unit group and the class group of arbitrary algebraic number fields Contents Introduction Topics from finite fields Arithmetic and polynomials Factorization of polynomials Topics from the geometry of numbers Hermite normal form Lattices Reduction Enumeration of lattice points Algebraic number fields Introduction Basic Arithmetic Computation of an integral basis Integral closure Round Two Method Round Four Method Computation of the unit group Dirichlet s unit theorem and a regulator bound Two methods for computing r independent units Fundamental unit computation Computation of the class group Ideals and class number A method for computing the class group Appendix The number field sieve KANT References Index

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