Solution To A Polynomial Equation

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Polynomials American Mathematical Soc.
Polynomial operators are a natural generalization of linear operators. Equations in such operators are the linear space analog of ordinary polynomials in one or several variables over the fields of real or complex numbers. Such equations encompass a broad spectrum of applied problems including all linear equations. Often the polynomial nature of many nonlinear problems goes unrecognized by researchers. This is more likely due to the fact that polynomial operators - unlike polynomials in a single variable - have received little attention. Consequently, this comprehensive presentation is needed, benefiting those working in the field as well as those seeking information about specific results or techniques. Polynomial Operator Equations in Abstract Spaces and Applications - an outgrowth of fifteen years of the author's research work - presents new and traditional results about polynomial equations as well as analyzes current iterative methods for their numerical solution in various general space settings. Topics include: Special cases of nonlinear operator equations Solution of polynomial operator equations of positive integer degree n Results on global existence theorems not related with contractions Galois theory Polynomial integral and polynomial differential equations appearing in radiative transfer, heat transfer, neutron transport, electromechanical networks, elasticity, and other areas Results on the various Chandrasekhar equations Weierstrass theorem Matrix representations Lagrange and Hermite interpolation Bounds of polynomial equations in Banach space, Banach algebra, and Hilbert space The materials discussed can be used for the following studies Advanced numerical analysis Numerical functional analysis Functional analysis Approximation theory Integral and differential equation

Elementary Algebra Cengage Learning
This book is a guide to concepts and practice in numerical algebraic geometry ? the solution of systems of polynomial equations by numerical methods. Through numerous examples, the authors show how to apply the well-received and widely used open-source Bertini software package to compute solutions, including a detailed manual on syntax and usage options. The authors also maintain a complementary web page where readers can find supplementary materials and Bertini input files. Numerically Solving Polynomial Systems with Bertini approaches numerical algebraic geometry from a user's point of view with numerous examples of how Bertini is applicable to polynomial systems. It treats the fundamental task of solving a given polynomial system and describes the latest advances in the field, including algorithms for intersecting and projecting algebraic sets, methods for treating singular sets, the nascent field of real numerical algebraic geometry, and applications to large polynomial systems arising from differential equations. Those who wish to solve polynomial systems can start gently by finding isolated solutions to small systems, advance rapidly to using algorithms for finding positive-dimensional solution sets (curves, surfaces, etc.), and learn how to use parallel computers on large problems. These techniques are of interest to engineers and scientists in fields where polynomial equations arise, including robotics, control theory, economics, physics, numerical PDEs, and computational chemistry.

The Numerical Solution of Systems of Polynomials Arising in Engineering and Science World Scientific
Transcendental equations arise in every branch of science and engineering. While most of these equations are easy to solve, some are not, and that is where this book serves as the mathematical equivalent of a skydiver's reserve parachute--not always needed, but indispensible when it is. The author's goal is to teach the art of finding the root of a single algebraic equation or a pair of such equations.

Precalculus Springer Science & Business Media
This book offers fascinating and modern perspectives into the theory and practice of the historical subject of polynomial root-finding, rejuvenating the field via polynomiography, a creative and novel computer visualization that renders spectacular images of a polynomial equation. Polynomiography will not only pave the way for new applications of polynomials in science and mathematics, but also in art and education. The book presents a thorough development of the basic family, arguably the most fundamental family of iteration functions, deriving many surprising and novel theoretical and practical applications such as: algorithms for approximation of roots of polynomials and analytic functions, polynomiography, bounds on zeros of polynomials, formulas for the approximation of Pi, and characterizations or visualizations associated with a homogeneous linear recurrence relation. These discoveries and a set of beautiful images that provide new visions, even of the well-known polynomials and recurrences, are the makeup of a very desirable book. This book is a must for mathematicians, scientists, advanced undergraduates and graduates, but is also for anyone with an appreciation for the connections between a fantastically creative art form and its ancient mathematical foundations.

Numerically Solving Polynomial Systems with Bertini World Scientific
This book, written by an accomplished female mathematician, is the second to explore nonstandard mathematical problems – those that are not directly solved by standard mathematical methods but instead rely on insight and the synthesis of a variety of mathematical ideas. It promotes mental activity as well as greater mathematical skills, and is an ideal resource for successful preparation for the mathematics Olympiad. Numerous strategies and techniques are presented that can be used to solve intriguing and challenging problems of the type often found in competitions. The author uses a friendly, non-intimidating approach to emphasize connections between different fields of mathematics and often proposes several different ways to attack the same problem. Topics covered include functions and their properties, polynomials, trigonometric and transcendental equations and inequalities, optimization, differential equations, nonlinear systems, and word problems. Over 360 problems are included with hints, answers, and detailed solutions. Methods of Solving Nonstandard Problems will interest high school and college students, whether they are preparing for a math competition or looking to improve their mathematical skills, as well as anyone who enjoys an intellectual challenge and has a special love for mathematics. Teachers and college professors will be able to use it as an extra resource in the classroom to augment a conventional course of instruction in order to stimulate abstract thinking and inspire original thought.

Solution of Equations and Systems of Equations Cambridge University Press
College Algebra provides a comprehensive exploration of algebraic principles and meets scope and sequence requirements for a typical introductory algebra course. The modular approach and richness of content ensure that the book meets the needs of a variety of courses. College Algebra offers a wealth of examples with detailed, conceptual explanations, building a strong foundation in the material before asking students to apply what they've learned. Coverage and Scope In determining the concepts, skills, and topics to cover, we engaged dozens of highly experienced instructors with a range of student audiences. The resulting scope and sequence proceeds logically while allowing for a significant amount of flexibility in instruction. Chapters 1 and 2 provide both a review and foundation for study of Functions that begins in Chapter 3. The authors recognize that while some institutions may find this material a prerequisite, other institutions have told us that they have a cohort that need the prerequisite skills built into the course. Chapter 1: Prerequisites Chapter 2: Equations and Inequalities Chapters 3-6: The Algebraic Functions Chapter 3: Functions Chapter 4: Linear Functions Chapter 5: Polynomial and Rational Functions Chapter 6: Exponential and Logarithm Functions Chapters 7-9: Further Study in College Algebra Chapter 7: Systems of Equations and Inequalities Chapter 8: Analytic Geometry Chapter 9: Sequences, Probability and Counting Theory

Lacunary Polynomials Over Finite Fields Simon and Schuster
This book introduces the numerical technique of polynomial continuation, which is used to compute solutions to systems of polynomial equations. Originally published in 1987, it remains a useful starting point for the reader interested in learning how to solve practical problems without advanced mathematics. Solving Polynomial Systems Using Continuation for Engineering and Scientific Problems is easy to understand, requiring only a knowledge of undergraduate-level calculus and simple computer programming. The book is also practical; it includes descriptions of various industrial-strength engineering applications and offers Fortran code for polynomial solvers on an associated Web page. It provides a resource for high-school and undergraduate mathematics projects. Audience: accessible to readers with limited mathematical backgrounds. It is appropriate for undergraduate mechanical engineering courses in which robotics and mechanisms applications are studied.

College Algebra Springer Science & Business Media
1. The generalized moment problem. 1.1. Formulations. 1.2. Duality theory. 1.3. Computational complexity. 1.4. Summary. 1.5. Exercises. 1.6. Notes and sources -- 2. Positive polynomials. 2.1. Sum of squares representations and semi-definite optimization. 2.2. Nonnegative versus s.o.s. polynomials. 2.3. Representation theorems : univariate case. 2.4. Representation theorems : mutivariate case. 2.5. Polynomials positive on a compact basic semi-algebraic set. 2.6. Polynomials nonnegative on real varieties. 2.7. Representations with sparsity properties. 2.8. Representation of convex polynomials. 2.9. Summary. 2.10. Exercises. 2.11. Notes and sources -- 3. Moments. 3.1. The one-dimensional moment problem. 3.2. The multi-dimensional moment problem. 3.3. The K-moment problem. 3.4. Moment conditions for bounded density. 3.5. Summary. 3.6. Exercises. 3.7. Notes and sources -- 4. Algorithms for moment problems. 4.1. The overall approach. 4.2. Semidefinite relaxations. 4.3. Extraction of solutions. 4.4. Linear relaxations. 4.5. Extensions. 4.6. Exploiting sparsity. 4.7. Summary. 4.8. Exercises. 4.9. Notes and sources. 4.10. Proofs -- 5. Global optimization over polynomials. 5.1. The primal and dual perspectives. 5.2. Unconstrained polynomial optimization. 5.3. Constrained polynomial optimization : semidefinite relaxations. 5.4. Linear programming relaxations. 5.5. Global optimality conditions. 5.6. Convex polynomial programs. 5.7. Discrete optimization. 5.8. Global minimization of a rational function. 5.9. Exploiting symmetry. 5.10. Summary. 5.11. Exercises. 5.12. Notes and sources -- 6. Systems of polynomial equations. 6.1. Introduction. 6.2. Finding a real solution to systems of polynomial equations. 6.3. Finding all complex and/or all real solutions : a unified treatment. 6.4. Summary. 6.5. Exercises. 6.6. Notes and sources -- 7. Applications in probability. 7.1. Upper bounds on measures with moment conditions. 7.2. Measuring basic semi-algebraic sets. 7.3. Measures with given marginals. 7.4. Summary. 7.5. Exercises. 7.6. Notes and sources -- 8. Markov chains applications. 8.1. Bounds on invariant measures. 8.2. Evaluation of ergodic criteria. 8.3. Summary. 8.4. Exercises. 8.5. Notes and sources -- 9. Application in mathematical finance. 9.1. Option pricing with moment information. 9.2. Option pricing with a dynamic model. 9.3. Summary. 9.4. Notes and sources -- 10. Application in control. 10.1. Introduction. 10.2. Weak formulation of optimal control problems. 10.3. Semidefinite relaxations for the OCP. 10.4. Summary. 10.5. Notes and sources -- 11. Convex envelope and representation of convex sets. 11.1. The convex envelope of a rational function. 11.2. Semidefinite representation of convex sets. 11.3. Algebraic certificates of convexity. 11.4. Summary. 11.5. Exercises. 11.6. Notes and sources -- 12. Multivariate integration 12.1. Integration of a rational function. 12.2. Integration of exponentials of polynomials. 12.3. Maximum entropy estimation. 12.4. Summary. 12.5. Exercises. 12.6. Notes and sources -- 13. Min-max problems and Nash equilibria. 13.1. Robust polynomial optimization. 13.2. Minimizing the sup of finitely many rational cunctions. 13.3. Application to Nash equilibria. 13.4. Exercises. 13.5. Notes and sources -- 14. Bounds on linear PDE. 14.1. Linear partial differential equations. 14.2. Notes and sources

Computations in Algebraic Geometry with Macaulay 2 Springer
Topics include vector spaces and matrices; orthogonal functions; polynomial equations; asymptotic expansions; ordinary differential equations; conformal mapping; and extremum problems. Includes exercises and solutions. 1962 edition.

Mathematics for the Physical Sciences Springer Science & Business Media
This book provides a general introduction to modern mathematical aspects in computing with multivariate polynomials and in solving algebraic systems. It presents the state of the art in several symbolic, numeric, and symbolic-numeric techniques, including effective and algorithmic methods in algebraic geometry and computational algebra, complexity issues, and applications ranging from statistics and geometric modelling to robotics and vision. Graduate students, as well as researchers in related areas, will find an excellent introduction to currently interesting topics. These cover Groebner and border bases, multivariate resultants, residues, primary decomposition, multivariate polynomial factorization, homotopy continuation, complexity issues, and their applications.

Solving Transcendental Equations Prentice Hall
Good,No Highlights,No Markup,all pages are intact, Slight Shelfwear,may have the corners slightly dented, may

have slight color changes/slightly damaged spine.

Polynomial Approximation of Differential Equations American Mathematical Soc.

Primarily a textbook to prepare Sixth Form students for public examinations in Hong Kong, this book is also useful as a reference for undergraduate students since it contains some advanced theory of equations beyond the sixth form level.

Polynomials CRC Press

The subject of this book is the solution of polynomial equations, that is, s- tems of (generally) non-linear algebraic equations. This study is at the heart of several areas of mathematics and its applications. It has provided the - tivation for advances in di?erent branches of mathematics such as algebra, geometry, topology, and numerical analysis. In recent years, an explosive - velopment of algorithms and software has made it possible to solve many problems which had been intractable up to then and greatly expanded the areas of applications to include robotics, machine vision, signal processing, structural molecular biology, computer-aided design and geometric modelling, as well as certain areas of statistics, optimization and game theory, and b- logical networks. At the same time, symbolic computation has proved to be an invaluable tool for experimentation and conjecture in pure mathematics. As a consequence, the interest in e?ective algebraic geometry and computer algebrahasextendedwellbeyonditsoriginalconstituencyofpureandapplied mathematicians and computer scientists, to encompass many other scientists and engineers. While the core of the subject remains algebraic geometry, it also calls upon many other aspects of mathematics and theoretical computer science, ranging from numerical methods, di?erential equations and number theory to discrete geometry, combinatorics and complexity theory. Thegoalofthisbookistoprovideageneralintroduction tomodernma- ematical aspects in computing with multivariate polynomials and in solving algebraic systems.

Solution of Differential Equation Models by Polynomial Approximation New York : Springer-Verlag

Solution of Equations and Systems of Equations, Second Edition deals with the Laguerre iteration, interpolating polynomials, method of steepest descent, and the theory of divided differences. The book reviews the formula for confluent divided differences, Newton's interpolation formula, general interpolation problems, and the triangular schemes for computing divided differences. The text explains the method of False Position (Regula Falsi) and cites examples of computation using the Regula Falsi. The book discusses iterations by monotonic iterating functions and analyzes the connection of the Regula Falsi with the theory of iteration. The text also explains the idea of the Newton-Raphson method and compares it with the Regula Falsi. The book also cites asymptotic behavior of errors in the Regula Falsi iteration, as well as the theorem on the error of the Taylor approximation to the root. The method of steepest descent or gradient method proposed by Cauchy ensures "global convergence" in very general conditions. This book is suitable for mathematicians, students, and professor of calculus, and advanced mathematics.

Computational Methods for Abstract Polynomial Equations BoD – Books on Demand

Polynomials are well known for their ability to improve their properties and for their applicability in the interdisciplinary fields of engineering and science. Many problems arising in engineering and physics are mathematically constructed by differential equations. Most of these problems can only be solved using special polynomials. Special polynomials and orthonormal polynomials provide a new way to analyze solutions of various equations often encountered in engineering and physical problems. In particular, special polynomials play a fundamental and important role in mathematics and applied mathematics. Until now, research on polynomials has been done in mathematics and applied mathematics only. This book is based on recent results in all areas related to polynomials. Divided into sections on theory and application, this book provides an overview of the current research in the field of polynomials. Topics include cyclotomic and Littlewood polynomials; Descartes' rule of signs; obtaining explicit formulas and identities for polynomials defined by generating functions; polynomials with symmetric zeros; numerical investigation on the structure of the zeros of the q-tangent polynomials; investigation and synthesis of robust polynomials in uncertainty on the basis of the root locus theory; pricing basket options by polynomial approximations; and orthogonal expansion in time domain method for solving Maxwell's equations using paralleling-in-order scheme.

Symbolic solution of polynomial equation systems with symmetry World Scientific

This book presents algorithmic tools for algebraic geometry, with experimental applications. It also introduces Macaulay 2, a computer algebra system supporting research in algebraic geometry, commutative algebra, and their applications. The algorithmic tools presented here are designed to serve readers wishing to bring such tools to bear on their own problems. The first part of the book covers Macaulay 2 using concrete applications; the second emphasizes details of the mathematics.

99 Variations on a Proof Springer Science & Business Media

Bridging a number of mathematical disciplines, and exposing many facets of systems of polynomial equations, Bernd Sturmfels's study covers a wide spectrum of mathematical techniques and algorithms, both symbolic and numerical.

Polynomials, Dynamics, and Choice Birkhäuser

Lacunary Polynomials Over Finite Fields focuses on reducible lacunary polynomials over finite fields, as well as stem polynomials, differential equations, and gaussian sums. The monograph first tackles preliminaries and formulation of Problems I, II, and III, including some basic concepts and notations, invariants of polynomials, stem polynomials, fully reducible polynomials, and polynomials with a restricted range. The text then takes a look at Problem I and reduction of Problem II to Problem III. Topics include reduction of the marginal case of Problem II to that of Problem III, proposition on power series, proposition on polynomials, and preliminary remarks on polynomial and differential equations. The publication ponders on Problem III and applications. Topics include homogeneous elementary symmetric systems of equations in finite fields; divisibility maximum properties of the gaussian sums and related questions; common representative systems of a finite abelian group with respect to given subgroups; and difference quotient of functions in finite fields. The monograph also reviews certain families of linear mappings in finite fields, appendix on the degenerate solutions of Problem II, a lemma on the greatest common divisor of polynomials with common gap, and two group-theoretical propositions. The text is a dependable reference for mathematicians and researchers interested in the study of reducible lacunary polynomials over finite fields.

Polynomial Operator Equations in Abstract Spaces and Applications Springer Science & Business Media

In many important areas of scientific computing, polynomials in one or more variables are employed in the mathematical modeling of real-life phenomena; yet most of classical computer algebra assumes exact rational data. This book is the first comprehensive treatment of the emerging area of numerical polynomial algebra, an area that falls between classical numerical analysis and classical computer algebra but, surprisingly, has received little attention so far. The author introduces a conceptual framework that permits the meaningful solution of various algebraic problems with multivariate polynomial equations whose coefficients have some indeterminacy; for this purpose, he combines approaches of both numerical linear algebra and commutative algebra. For the application scientist, Numerical Polynomial Algebra provides both a survey of polynomial problems in scientific computing that may be solved numerically and a guide to their numerical treatment. In addition, the book provides both introductory sections and novel extensions of numerical analysis and computer algebra, making it accessible to the reader with expertise in either one of these areas.

Intermediate Algebra 2e SIAM

This well-written book is a timely and significant contribution to the understanding of difference equations. Presenting machinery for analyzing many discrete physical situations, the book will be of interest to physicists and engineers as well as mathematicians. The book develops a theory for regular and singular Sturm-Liouville boundary value problems for difference equations, generalizing many of the known results for differential equations. Discussing the self-adjointness of these problems as well as their abstract spectral resolution in the appropriate L^2 setting, the book gives necessary and sufficient conditions for a second-order difference operator to be self-adjoint and have orthogonal polynomials as eigenfunctions. These polynomials are classified into four categories, each of which is given a properties survey and a representative example. Finally, the book shows that the various difference operators defined for these problems are still self-adjoint when restricted to ``energy norms". This book is suitable as a text for an advanced graduate course on Sturm-Liouville operators or on applied analysis.