

ENCYCLOPEDIA OF MATHEMATICS AND ITS APPLICATIONS

ITERATIVE FUNCTIONAL EQUATIONS

MAREK KUCZMA, BOGDAN CHOCZEWSKI
and ROMAN GER



Iterative Functional Equations

Janusz Morawiec

Iterative Functional Equations:

Iterative Functional Equations Marek Kuczma, Bogdan Choczewski, Roman Ger, 1990-07-27 A cohesive and comprehensive account of the modern theory of iterative functional equations. Many of the results included have appeared before only in research literature making this an essential volume for all those working in functional equations and in such areas as dynamical systems and chaos to which the theory is closely related. The authors introduce the reader to the theory and then explore the most recent developments and general results. Fundamental notions such as the existence and uniqueness of solutions to the equations are stressed throughout as are applications of the theory to such areas as branching processes, differential equations, ergodic theory, functional analysis and geometry. Other topics covered include systems of linear and nonlinear equations of finite and infinite ORD, various function classes, conjugate and commutable functions, linearization, iterative roots of functions and special functional equations.

Iterative Functional Equations, 1990 **Iteration**

Theory and its Functional Equations Roman Liedl, Ludwig Reich, György Targonski, 2006-11-14 Analytic Solutions of Functional Equations Sui Sun Cheng, Wenrong Li, 2008 The purpose of this volume is to examine bio informatics and quantum information which are growing rapidly at present and to attempt to connect the two with a view to enumerating and solving the many fundamental problems they entail. To this end we look for interdisciplinary bridges in mathematics, physics and information and life sciences. In particular research into a new paradigm for information science and life science on the basis of quantum theory is emphasized.

Functional Equations and How to Solve Them Christopher G. Small, 2006-11-14 Many books have been written on the theory of functional equations but very few help readers solve functional equations in mathematics competitions and mathematical problem solving. This book fills that gap. Each chapter includes a list of problems associated with the covered material. These vary in difficulty with the easiest being accessible to any high school student who has read the chapter carefully. The most difficult will challenge students studying for the International Mathematical Olympiad or the Putnam Competition. An appendix provides a springboard for further investigation of the concepts of limits, infinite series and continuity.

Iterative Functional Equations Sukrawan Talwong, Mahāwitthayālai Kasētsāt. Department of Mathematics, 2004 Iteration Theory and Its Functional Equations Roman Liedl, Ludwig Reich, György

Targonski, 2014-01-15 **Iteration Theory and Its Functional Equations** Roman Liedl, Ludwig Reich, György I.

Targonski, 1985 Developments in Functional Equations and Related Topics Janusz Brzdek, Krzysztof Ciepliński, Themistocles M. Rassias, 2017-08-14 This book presents current research on Ulam stability for functional equations and inequalities. Contributions from renowned scientists emphasize fundamental and new results, methods and techniques. Detailed examples are given to theories to further understanding at the graduate level for students in mathematics, physics and engineering. Key topics covered in this book include: Quasi means, Approximate isometries, Functional equations in hypergroups, Stability of functional equations, Fischer-Muszely equation, Haar meager sets and Haar null sets, Dynamical

systems Functional equations in probability theory Stochastic convex ordering Dhombres functional equation Nonstandard analysis and Ulam stability This book is dedicated in memory of Stanisław Marcin Ulam who posed the fundamental problem concerning approximate homomorphisms of groups in 1940 which has provided the stimulus for studies in the stability of functional equations and inequalities *Functional Equations and Inequalities* Themistocles M. Rassias, 2000-07-31

Functional Equations and Inequalities provides an extensive study of some of the most important topics of current interest in functional equations and inequalities. Subjects dealt with include a Pythagorean functional equation a functional definition of trigonometric functions the functional equation of the square root spiral a conditional Cauchy functional equation an iterative functional equation the Hille type functional equation the polynomial-like iterative functional equation distribution of zeros and inequalities for zeros of algebraic polynomials a qualitative study of Lobachevsky's complex functional equation functional inequalities in special classes of functions replicativity and function spaces normal distributions some difference equations finite sums decompositions of functions harmonic functions set-valued quasiconvex functions the problem of expressibility in some extensions of free groups Aleksandrov problem and mappings which preserve distances Ulam's problem stability of some functional equation for generalized trigonometric functions Hyers-Ulam stability of Hosszú's equation superstability of a functional equation and some demand functions in a duopoly market with advertising. It is a pleasure to express my deepest appreciation to all the mathematicians who contributed to this volume. Finally we wish to acknowledge the superb assistance provided by the staff of Kluwer Academic Publishers June 2000. Themistocles M. Rassias xi

ON THE STABILITY OF A FUNCTIONAL EQUATION FOR GENERALIZED TRIGONOMETRIC FUNCTIONS ROMAN Badora
Instytut Matematyki Uniwersytetu Śląskiego ul. Bankowa 14 PL 40 007 Katowice Poland e-mail: robadora@mat.us.edu.pl

Abstract In the present paper the stability result concerning a functional equation for generalized trigonometric functions is presented Z. **Linear Iterative Functional Equations with Random-valued Functions** Janusz Marian Morawiec, 2023

On Functions and Functional Equations Smital, 1988-01-01 *On Functions and Functional Equations* introduces the main topics in iteration theory and the theory of functional equations with emphasis on applications in the fields of mathematics, physics, biology, chemistry, and electronics and mechanical engineering. The book contains many classical results as well as important more recent results. It also includes numerous exercises and some problems that have yet to be resolved. The book is accessible to readers having a secondary level mathematical education. *Functional Equations of Iterative Type* Mariusz Bajger, 1996

Functional Equations in a Single Variable Marek Kuczma, 1968 **A Two Parameter Family of Operators and Iterative Functional Equations** H.-H. Kairies, 2000 **Introduction to Functional Equations** Costas Efthimiou, 2011-10-13 Functions and their properties have been part of the rigorous precollege curriculum for decades. And functional equations have been a favorite topic of the leading national and international mathematical competitions. Yet the subject has not received equal attention by authors at an introductory level. The majority of the books on

the topic remain unreachable to the curious and intelligent precollege student The present book is an attempt to eliminate this disparity The book opens with a review chapter on functions which collects the relevant foundational information on functions plus some material potentially new to the reader The next chapter presents a working definition of functional equations and explains the difficulties in trying to systematize the theory With each new chapter the author presents methods for the solution of a particular group of equations Each chapter is complemented with many solved examples the majority of which are taken from mathematical competitions and professional journals The book ends with a chapter of unsolved problems and some other auxiliary material The book is an invaluable resource for precollege and college students who want to deepen their knowledge of functions and their properties for teachers and instructors who wish to enrich their curricula and for any lover of mathematical problem solving techniques In the interest of fostering a greater awareness and appreciation of mathematics and its connections to other disciplines and everyday life MSRI and the AMS are publishing books in the Mathematical Circles Library series as a service to young people their parents and teachers and the mathematics profession

A Recurrent Method of Solving Iterative Functional Equations Witold Jarczyk,1991

Functional Equations and Modelling in Science and Engineering Enrique Castillo,1992-05-27 Provides engineers and applied scientists with some selected results of functional equations and their applications with the intention of changing the way they think about mathematical modelling Many of the proofs are simplified or omitted so as not to bore or confuse engineers Functional equati

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Morawiec,2023 **Functional Equations, Inequalities and Applications** Themistocles RASSIAS,2013-03-09 Functional Equations Inequalities and Applications provides an extensive study of several important equations and inequalities useful in a number of problems in mathematical analysis Subjects dealt with include the generalized Cauchy functional equation the Ulam stability theory in the geometry of partial differential equations stability of a quadratic functional equation in Banach modules functional equations and mean value theorems isometric mappings functional inequalities of iterative type related to a Cauchy functional equation the median principle for inequalities and applications Hadamard and Dragomir Agarwal inequalities the Euler formulae and convex functions and approximate algebra homomorphisms Also included are applications to some problems of pure and applied mathematics This book will be of particular interest to mathematicians and graduate students whose work involves functional equations inequalities and applications

Unveiling the Energy of Verbal Beauty: An Emotional Sojourn through **Iterative Functional Equations**

In some sort of inundated with monitors and the cacophony of quick transmission, the profound power and emotional resonance of verbal beauty frequently disappear into obscurity, eclipsed by the constant onslaught of noise and distractions. However, situated within the musical pages of **Iterative Functional Equations**, a charming perform of fictional elegance that pulses with organic feelings, lies an unforgettable journey waiting to be embarked upon. Published by way of a virtuoso wordsmith, this enchanting opus courses viewers on an emotional odyssey, softly exposing the latent potential and profound affect stuck within the complicated internet of language. Within the heart-wrenching expanse of the evocative evaluation, we can embark upon an introspective exploration of the book's main themes, dissect their captivating writing design, and immerse ourselves in the indelible impression it leaves upon the depths of readers' souls.

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