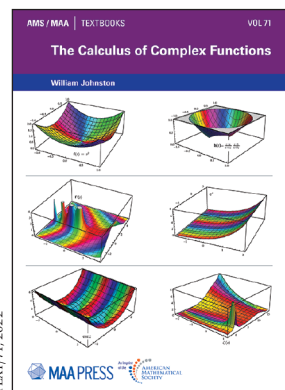


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The Calculus of Complex Functions

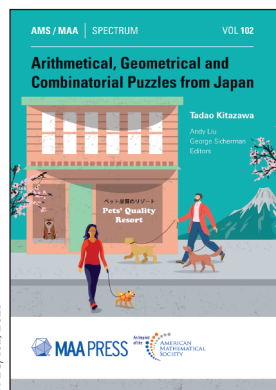
By William Johnston

This is a beautiful text that introduces complex analysis as a natural extension of the calculus of real-valued functions. The mechanism for doing so is the Extension Theorem: Any real analytic function extends to an analytic function defined in a region of the complex plane. The

connection to real functions and calculus is then natural. The introduction to analytic functions feels intuitive and their fundamental properties are covered quickly. As a result, the book covers a surprisingly large number of topics in classical analysis: analytic and meromorphic functions, harmonic functions, contour integrals and series representations, conformal maps, and the Dirichlet problem. In a remarkably effective and accessible manner, it also introduces advanced notions of analytic number theory, the Riemann hypothesis, Weierstrass factorization and the associated inner-outer factorization, and operator theory. The last chapter describes bounded linear operators on Hilbert and Banach spaces, including the spectral theory of compact operators, in a way that also provides an excellent review of important topics in linear algebra and gives students the necessary background to begin to do research in analysis.

The exposition is lively but remarkably smooth and readable. Johnston is a remarkable teacher, he understands where his students are and how they see things. The reader is repeatedly reminded of what they already know about calculus in the real case and how what they are learning is both a natural extension and surprisingly different (and easier!). There are nearly one thousand exercises of a variety of types and levels. In particular, each chapter contains at least one project-level exploration. Each chapter also concludes with an essay describing a part of the history of the subject.

The AMS Bookshelf is prepared bimonthly by AMS Acquisitions Specialist for MAA Press titles Stephen Kennedy. His email address is skennedy@amsbooks.org.



Arithmetical, Geometrical and Combinatorial Puzzles from Japan

By Tadao Kitazawa

Edited by Andy Liu

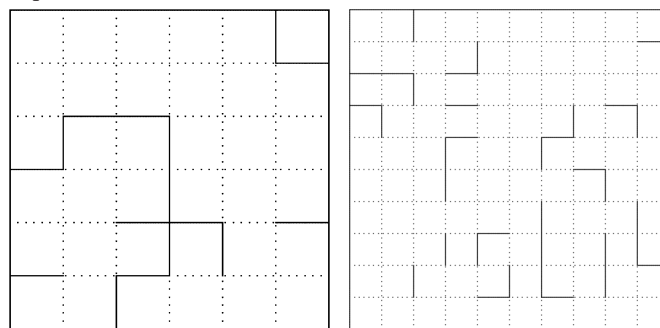
and George Sicherman

Tadao Kitazawa is a well-known and prolific Japanese puzzle designer. He is part of the rich recreational mathematics culture in Japan and his puzzles are unlike the puzzles encountered in the

English-language literature. The puzzles in this collection, all designed by Kitazawa, have been published in the newsletter of the Academy of Recreational Mathematics of Japan.

For example: The first 60 integers are to be partitioned into thirty pairs so that the difference between the two numbers in the same pair is either 1 or 10. Given that two of the pairs are (10,11) and (20,30) which number is paired with 41? (Hint below.)

Kitazawa's puzzles are sometimes inspired by subtle tweaks of existing puzzles. He has a knack for twisting existing ideas in ways that can be magical. Tower Squares are inspired by Latin squares but each row and column contains one 1, two 2s, three 3s, etc. In the squares below a boldfaced line separates identical numbers, a dotted line separates distinct numbers. Fill in the numbers.



Hint: Imagine the numbers arranged in a six-by-ten grid colored like a checkerboard. Most pairs would contain a black square and a white square. Consider the possible exceptions.