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Complex Analysis

Series: Undergraduate Texts in Mathematics

- The solution of the cubic equation and Newton's method for approximating the zeroes of any polynomial
- Expanded treatments of the Schwarz reflection principle and of the mapping properties of analytic functions on closed domains
- An introduction to Schwarz-Christoffel transformations and to Dirichlet series
- A streamlined proof of the prime number theorem, and more

Beginning with the first edition of Complex Analysis, we have attempted to present the classical and beautiful theory of complex variables in the clearest and most intuitive form possible. The changes in this edition, which include additions to ten of the nineteen chapters, are intended to provide the additional insights that can be obtained by seeing a little more of the "big picture". This includes additional related results and occasional generalizations that place the results in a slightly broader context. The Fundamental Theorem of Algebra is enhanced by three related results. Section 1.3 offers a detailed look at the solution of the cubic equation and its role in the acceptance of complex numbers. While there is no formula for determining the roots of a general polynomial, we added a section on Newton's Method, a numerical technique for approximating the zeroes of any polynomial. And the Gauss-Lucas Theorem provides an insight into the location of the zeroes of a polynomial and those of its derivative. A series of new results relate to the mapping properties of analytic functions. A revised proof of Theorem 6.15 leads naturally to a discussion of the connection between critical points and saddle points in the complex plane. The proof of the Schwarz Reflection Principle has been expanded to include reflection across analytic arcs, which plays a key role in a new section (14.3) on the mapping properties of analytic functions on closed domains. And our treatment of special mappings has been enhanced by the inclusion of Schwarz-Christoffel transformations.

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