Complex Function $\boxed{w = f(z)}$

$$z = \text{complex number}$$

$$z = x + iy \qquad i = \sqrt{-1}$$

real part & imaginary part

eg. $w = f(z) = z^2 + 4 = (x + iy)^2 + 4$

$$= x^2 + (iy)^2 + 2x(iy) + 4$$

$$= \underbrace{x^2 - y^2 + 4}_{\text{real part}} + \underbrace{i \, 2xy}_{\text{imaginary part}}$$

real part   imaginary part
$u = u(x,y)$ $v = v(x,y)$

$$w = f(z) = u + iv = u(x,y) + i \, v($$

[Complex Function Theory](#)

Donald Sarason

Complex Function Theory:

   Classical Topics in Complex Function Theory Reinhold Remmert,2013-03-14 An ideal text for an advanced course in the theory of complex functions this book leads readers to experience function theory personally and to participate in the work of the creative mathematician The author includes numerous glimpses of the function theory of several complex variables which illustrate how autonomous this discipline has become In addition to standard topics readers will find Eisenstein s proof of Euler s product formula for the sine function Wielandts uniqueness theorem for the gamma function Stirlings formula Isssas theorem Besses proof that all domains in C are domains of holomorphy Wedderburns lemma and the ideal theory of rings of holomorphic functions Estermanns proofs of the overconvergence theorem and Blochs theorem a holomorphic imbedding of the unit disc in C3 and Gausss expert opinion on Riemanns dissertation Remmert elegantly presents the material in short clear sections with compact proofs and historical comments interwoven throughout the text The abundance of examples exercises and historical remarks as well as the extensive bibliography combine to make an invaluable source for students and teachers alike   Theory of Complex Functions Reinhold Remmert,2012-12-06 A lively and vivid look at the material from function theory including the residue calculus supported by examples and practice exercises throughout There is also ample discussion of the historical evolution of the theory biographical sketches of important contributors and citations in the original language with their English translation from their classical works Yet the book is far from being a mere history of function theory and even experts will find a few new or long forgotten gems here Destined to accompany students making their way into this classical area of mathematics the book offers quick access to the essential results for exam preparation Teachers and interested mathematicians in finance industry and science will profit from reading this again and again and will refer back to it with pleasure   *An Introduction to Complex Function Theory* Bruce P. Palka,1991 This book provides a rigorous yet elementary introduction to the theory of analytic functions of a single complex variable While presupposing in its readership a degree of mathematical maturity it insists on no formal prerequisites beyond a sound knowledge of calculus Starting from basic definitions the text slowly and carefully develops the ideas of complex analysis to the point where such landmarks of the subject as Cauchy s theorem the Riemann mapping theorem and the theorem of Mittag Leffler can be treated without sidestepping any issues of rigor The emphasis throughout is a geometric one most pronounced in the extensive chapter dealing with conformal mapping which amounts essentially to a short course in that important area of complex function theory Each chapter concludes with a wide selection of exercises ranging from straightforward computations to problems of a more conceptual and thought provoking nature   Function Theory of One Complex Variable Robert Everist Greene,Steven George Krantz,2006 Complex analysis is one of the most central subjects in mathematics It is compelling and rich in its own right but it is also remarkably useful in a wide variety of other mathematical subjects both pure and applied This book covers complex variables as a direct development from multivariable real calculus

Complex Analysis Murali Rao,Henrik Stetk␣r,1991 This is a rigorous introduction to the theory of complex functions of one complex variable The authors have made an effort to present some of the deeper and more interesting results for example Picard s theorems Riemann mapping theorem Runge s theorem in the first few chapters However the very basic theory is nevertheless given a thorough treatment so that readers should never feel lost After the first five chapters the order may be adapted to suit the course Each chapter finishes with exercises *Complex Function Theory* Donald Sarason,2021-02-16 Complex Function Theory is a concise and rigorous introduction to the theory of functions of a complex variable Written in a classical style it is in the spirit of the books by Ahlfors and by Saks and Zygmund Being designed for a one semester course it is much shorter than many of the standard texts Sarason covers the basic material through Cauchy s theorem and applications plus the Riemann mapping theorem It is suitable for either an introductory graduate course or an undergraduate course for students with adequate preparation The first edition was published with the title Notes on Complex Function Theory **Complex Analysis** Jerry R. Muir, Jr.,2015-05-26 A thorough introduction to the theory of complex functions emphasizing the beauty power and counterintuitive nature of the subject Written with a reader friendly approach Complex Analysis A Modern First Course in Function Theory features a self contained concise development of the fundamental principles of complex analysis After laying groundwork on complex numbers and the calculus and geometric mapping properties of functions of a complex variable the author uses power series as a unifying theme to define and study the many rich and occasionally surprising properties of analytic functions including the Cauchy theory and residue theorem The book concludes with a treatment of harmonic functions and an epilogue on the Riemann mapping theorem Thoroughly classroom tested at multiple universities Complex Analysis A Modern First Course in Function Theory features Plentiful exercises both computational and theoretical of varying levels of difficulty including several that could be used for student projects Numerous figures to illustrate geometric concepts and constructions used in proofs Remarks at the conclusion of each section that place the main concepts in context compare and contrast results with the calculus of real functions and provide historical notes Appendices on the basics of sets and functions and a handful of useful results from advanced calculus Appropriate for students majoring in pure or applied mathematics as well as physics or engineering Complex Analysis A Modern First Course in Function Theory is an ideal textbook for a one semester course in complex analysis for those with a strong foundation in multivariable calculus The logically complete book also serves as a key reference for mathematicians physicists and engineers and is an excellent source for anyone interested in independently learning or reviewing the beautiful subject of complex analysis Geometric Function Theory Steven G. Krantz,2006 Presented from a geometric analytical viewpoint this work addresses advanced topics in complex analysis that verge on modern areas of research Methodically designed with individual chapters containing a rich collection of exercises examples and illustrations **Complex Function Theory** Anthony S. B. Holland,1980 Function Theory of Several Complex Variables Steven

George Krantz,2001 Emphasizing integral formulas the geometric theory of pseudoconvexity estimates partial differential equations approximation theory inner functions invariant metrics and mapping theory this title is intended for the student with a background in real and complex variable theory harmonic analysis and differential equations **Geometric Function Theory in Several Complex Variables** Junjirō Noguchi,Takushiro Ochiai,1990 This is an expanded English language version of a book by the same authors that originally appeared in the Japanese The book serves two purposes The first is to provide a self contained and coherent account of recent developments in geometric function theory in several complex variables aimed at those who have already mastered the basics of complex function theory and the elementary theory of differential and complex manifolds The second goal is to present in a self contained way fundamental descriptions of the theory of positive currents plurisubharmonic functions and meromorphic mappings which are today indispensable in the analytic and geometric theories of complex functions of several variables The book should prove useful for researchers and graduate students alike *Function Theory on Planar Domains* Stephen D. Fisher,2014-06-10 A high level treatment of complex analysis this text focuses on function theory on a finitely connected planar domain Clear and complete it emphasizes domains bounded by a finite number of disjoint analytic simple closed curves The first chapter and parts of Chapters 2 and 3 offer background material all of it classical and important in its own right The remainder of the text presents results in complex analysis from the far middle and recent past all selected for their interest and merit as substantive mathematics Suitable for upper level undergraduates and graduate students this text is accessible to anyone with a background in complex and functional analysis Author Stephen D Fisher a professor of mathematics at Northwestern University elaborates upon and extends results with a set of exercises at the end of each chapter **Notes on Complex Function Theory** Donald Sarason,1994 *Complex Functions* Gareth A. Jones,David Singerman,1987-03-19 An elementary account of many aspects of classical complex function theory including Mobius transformations elliptic functions Riemann surfaces Fuchsian groups and modular functions The book is based on lectures given to advanced undergraduate students and is well suited as a textbook for a second course in complex function theory **Hidden Harmony—Geometric Fantasies** Umberto Bottazzini,Jeremy Gray,2013-06-21 This book is a history of complex function theory from its origins to 1914 when the essential features of the modern theory were in place It is the first history of mathematics devoted to complex function theory and it draws on a wide range of published and unpublished sources In addition to an extensive and detailed coverage of the three founders of the subject Cauchy Riemann and Weierstrass it looks at the contributions of authors from d Alembert to Hilbert and Laplace to Weyl Particular chapters examine the rise and importance of elliptic function theory differential equations in the complex domain geometric function theory and the early years of complex function theory in several variables Unique emphasis has been devoted to the creation of a textbook tradition in complex analysis by considering some seventy textbooks in nine different languages The book is not a mere sequence of disembodied results and theories but offers

a comprehensive picture of the broad cultural and social context in which the main actors lived and worked by paying attention to the rise of mathematical schools and of contrasting national traditions The book is unrivaled for its breadth and depth both in the core theory and its implications for other fields of mathematics It documents the motivations for the early ideas and their gradual refinement into a rigorous theory   **Introduction To The Theory Of Complex Functions** Shi-giang Liu,Jian-ke Lu,Shou-guo Zhong,2002-11-26 This book is based on the teaching experience of the authors and therefore some of the topics are presented in a new form For instance the multi valued properties of the argument function are discussed in detail so that the beginner may readily grasp the elementary multi valued analytic functions The residue theorem is extended to the case where poles of analytic functions considered may occur on the boundary of a region which is very useful in applications but not seen in textbooks written in English   **Complex Function Theory** Takeo Fujiwara,2023-06-26 The basics of complex functions will be explained for students of Engineering Sciences with the aim of being able to use complex function theory as a tool The goal is not rigor as mathematics but ease of use that may suit the application Explanations are based on concrete examples rather than abstract general theory The book starts from very beginning of complex numbers and extends theory of Introduction to Elliptic Function and Hypergeometric Differential Equations   **Complex Function Theory** ,2014-05-14 Complex Function Theory   *Cauchy and the Creation of Complex Function Theory* Frank Smithies,Smithies Frank,1997-11-20 Dr Smithies analysis of the process whereby Cauchy created the basic structure of complex analysis begins by describing the 18th century background He then proceeds to examine the stages of Cauchy s own work culminating in the proof of the residue theorem Controversies associated with the the birth of the subject are also considered in detail Throughout new light is thrown on Cauchy s thinking during this watershed period This authoritative book is the first to make use of the whole spectrum of available original sources   Real and Complex Analysis CHRISTOPHER. SURACE APELIAN (STEVE.),Steve Surace,2019-08-30 Presents Real Complex Analysis Together Using a Unified Approach A two semester course in analysis at the advanced undergraduate or first year graduate level Unlike other undergraduate level texts Real and Complex Analysis develops both the real and complex theory together It takes a unified elegant approach to the theory that is consistent with the recommendations of the MAA s 2004 Curriculum Guide By presenting real and complex analysis together the authors illustrate the connections and differences between these two branches of analysis right from the beginning This combined development also allows for a more streamlined approach to real and complex function theory Enhanced by more than 1 000 exercises the text covers all the essential topics usually found in separate treatments of real analysis and complex analysis Ancillary materials are available on the book s website This book offers a unique comprehensive presentation of both real and complex analysis Consequently students will no longer have to use two separate textbooks one for real function theory and one for complex function theory

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