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AEC - PRESTON JACOBS

This book is written to be a convenient reference for the working scientist, student, or engineer who needs to know and use basic concepts in complex analysis. It is not a book of mathematical theory. It is instead a book of mathematical practice. All the basic ideas of complex analysis, as well as many typical applica tions, are treated. Since we are not developing theory and proofs, we have not been obliged to conform to a strict logical ordering of topics. Instead, topics have been organized for ease of reference, so that cognate topics appear in one place. Required background for reading the text is minimal: a good ground ing in (real variable) calculus will suffice. However, the reader who gets maximum utility from the book will be that reader who has had a course in complex analysis at some time in his life. This book is a handy com pendium of all basic facts about complex variable theory. But it is not a textbook, and a person would be hard put to endeavor to learn the subject by reading this book.
The idea of complex numbers dates back at least 300 years—to Gauss and Euler, among others. Today complex analysis is a central part of modern analytical thinking. It is used in engineering, physics, mathematics, astrophysics, and many other fields. It provides powerful tools for doing mathematical analysis, and often yields pleasing and unanticipated answers. This book makes the subject of complex analysis accessible to a broad audience. The complex numbers are a somewhat mysterious number system that seems to come out of the blue. It is important for students to see that this is re-

ally a very concrete set of objects that has very concrete and meaningful applications. Features: This new edition is a substantial rewrite, focusing on the accessibility, applied, and visual aspect of complex analysis This book has an exceptionally large number of examples and a large number of figures. The topic is presented as a natural outgrowth of the calculus. It is not a new language, or a new way of thinking. Incisive applications appear throughout the book. Partial differential equations are used as a unifying theme.

Version 6.0. An introductory course on differential equations aimed at engineers. The book covers first order ODEs, higher order linear ODEs, systems of ODEs, Fourier series and PDEs, eigenvalue problems, the Laplace transform, and power series methods. It has a detailed appendix on linear algebra. The book was developed and used to teach Math 286/285 at the University of Illinois at Urbana-Champaign, and in the decade since, it has been used in many classrooms, ranging from small community colleges to large public research universities. See https: //www.jirka.org/diffyqs/ for more information, updates, errata, and a list of classroom adoptions.

Using the familiar software Microsoft ® Excel, this book examines the applications of complex variables. Implementation of the included problems in Excel eliminates the “black box” nature of more advanced computer software and programming languages and therefore the reader has the chance to become more familiar with the underlying mathematics of the complex variable problems. This book consists of two parts. In Part I, several topics are covered that one would expect to find in an introductory text on complex variables. These topics include an overview of complex numbers, functions of a complex variable, and the Cauchy integral formula. In particular, attention is given to the study of analytic complex variable functions. This attention is warranted because of the property that the real and imaginary parts of an analytic complex variable function can be used to solve the Laplace partial differential equation (PDE). Laplace's equation is ubiquitous throughout science and engineering as it can be used to model the steady-state conditions of several important transport processes including heat transfer, soil-water flow, electrostatics, and ideal fluid flow, among others. In Part II, a specialty application of complex variables known as the Complex Variable Boundary Element Method (CVBEM) is examined. CVBEM is a numerical method used for solving boundary value problems governed by Laplace's equation. This part contains a detailed description of the CVBEM and a guide through each step of constructing two CVBEM programs in Excel. The writing of these programs is the culminating event of the book. Students of complex variables and anyone with an interest in a novel method for approximating potential functions using the principles of complex variables are the intended audience for this book. The Microsoft Excel applications (including simple programs as well as the CVBEM program) covered will also be of interest in the industry, as these programs are accessible to anybody with Microsoft Office.

The purpose of this book is to give an introduction to the Laplace transform on the undergraduate level. The material is drawn from notes for a course taught by the author at the Milwaukee School of Engineering. Based on classroom experience, an attempt has been made to (1) keep the proofs short, (2) introduce applications as soon as possible, (3) concentrate on problems that are difficult to handle by the older classical methods, and (4) emphasize periodic phenomena. To make it possible to offer the course early in the curriculum (after differential equations), no knowledge of complex variable theory is assumed. However, since a thorough study of Laplace. transforms requires at least the rudiments of this theory, Chapter 3 includes a brief sketch of complex variables, with many of the details presented in Appendix A. This plan permits an introduction of the complex inversion formula, followed by additional applications. The author has found that a course taught three hours a week for a quarter can be based on the material in Chapters 1, 2, and 5 and the first three sections of Chapter 7. If additional time is available (e.g., four quarter-hours or three semester-hours), the whole book can be covered easily. The author is indebted to the students at the Milwaukee School of Engineering for their many helpful comments and criticisms.

I - Entire functions of several complex variables constitute an important and original chapter in complex analysis. The study is often motivated by certain applications to specific problems in other areas of mathematics: partial differential equations via the Fourier-Laplace transformation and convolution operators, analytic number theory and problems of transcen dence, or approximation theory, just to name a few. What is important for these applications is to find solutions which satisfy certain growth conditions. The specific problem defines inherently a growth scale, and one seeks a solution of the problem which satisfies certain growth conditions on this scale, and sometimes solutions of minimal asymp totic growth or optimal solutions in some sense. For one complex variable the study of solutions with growth conditions forms the core of the classical theory of entire functions and, historically, the relationship between the number of zeros of an entire function f(z) of one complex variable and the growth of If I (or equivalently log If I) was the first example of a systematic study of growth conditions in a general setting. Problems with growth conditions on the solutions demand much more precise information than existence theorems. The correspondence between two scales of growth can be interpreted often as a correspondence between families of bounded sets in certain Frechet spaces. However, for applications it is of utmost importance to develop precise and explicit representations of the solutions.

Explores the interrelations between real and complex numbers by adopting both generalization and specialization methods to move between them, while simultaneously examining their analytic and geometric characteristics Engaging exposition with discussions, remarks, questions, and exercises to motivate understanding and critical thinking skills Encludes numerous examples and applications relevant to science and engineering students

This introduction to complex variable methods for scientists and engineers begins by carefully defining complex numbers and analytic functions and then offers accounts of complex integration, Taylor series, singularities, residues, and mappings. Both algebraic and geometric tools are employed to provide the greatest understanding, with many diagrams illustrating the concepts introduced. The book emphasizes the importance of understanding the use of methods, rather than on rigorous proofs. The book's devotion to applications of the material to physical problems will appeal to scientists. Example applications include detailed treatments of potential theory, hydrodynamics, electrostatics, gravitation and the uses of the Laplace transform for partial differential equations. With 300 stimulating exercises and solutions it will be highly suitable for students wishing to learn the elements of complex analysis in an applied context.

This text on complex variables is geared toward graduate students and undergraduates who have taken an introductory course in real analysis. It is a substantially revised and updated edition of the popular text by Robert B. Ash, offering a concise treatment that provides careful and complete explanations as well as numerous problems and solutions. An introduction presents basic definitions, covering topology of the plane, analytic functions, real-differentiability and the Cauchy-Riemann equations, and exponential and harmonic functions. Succeeding chapters examine the elementary theory and the general Cauchy theorem and its applications, including singularities, residue theory, the open mapping theorem for analytic functions, linear fractional transformations, conformal mapping, and analytic mappings of one disk to another. The Riemann mapping theorem receives a thorough treatment, along with factorization of analytic functions. As an application of many of the ideas and results appearing in earlier chapters, the text ends with a proof of the prime number theorem.

This book investigates several classes of partial differential equations of real time variable and complex spatial variables, including the heat, Laplace, wave, telegraph, Burgers, Black–Merton–Scholes, Schrödinger and Korteweg–de Vries equations. The complexification of the spatial variable is done by two different methods. The first method is that of complexifying the spatial variable in the corresponding semigroups of operators. In this case, the solutions are studied within the context of the theory of semigroups of linear operators. It is also interesting to observe that these solutions preserve some geometric properties of the boundary function, like the univalence, starlikeness, convexity and spirallikeness. The second method is that of complexifying the spatial variable directly in the corresponding evolution equation from the real case. More precisely, the real spatial variable is replaced by a complex spatial variable in the corresponding evolution equation and then analytic and non-analytic solutions are sought. For the first time in the book literature, we aim to give a comprehensive study of the most important evolution equations of real time variable and complex spatial variables. In some cases, potential physical interpretations are presented. The generality of the methods used allows the study of evolution equations of spatial variables in general domains of the complex plane. Contents:Historical Background and Motivation-Heat and Laplace Equations of Complex Spatial VariablesHigher-Order Heat and Laplace Equations with Complex Spatial VariablesWave and Telegraph Equations with Complex Spatial VariablesBurgers and Black–Merton–Scholes Equations with Complex Spatial VariablesSchrödinger-Type Equations with Complex Spatial VariablesLinearized Korteweg–de Vries Equations with Complex Spatial VariablesEvolution Equations with a Complex Spatial Variable in General Domains Readership: Graduates and researchers in partial differential equations and in classical analytical function theory of one complex variable. Key Features:For the first time in literature, the study of evolution equations of real time variable and complex spatial variables is madeThe study includes some of the most important classes of partial differential equations: heat, Laplace, wave, telegraph, Burgers, Black–Merton–Scholes, Schrodinger and Korteweg–de Vries equationsThe book is entirely based on the authors' own workKeywords:Evolution Equations of Complex Spatial Variables;Semigroup of Linear Operators;Complex Convolution Integrals;Heat;Laplace;Wave;Telegraph;Burgers;Blackâ Mertonâ Scholes;Schrodinger;Kortewegâ de Vries Equations

At almost all academic institutions worldwide, complex variables and analytic functions are utilized in courses on applied mathematics, physics, engineering, and other related subjects. For most students, formulas alone do not provide a sufficient introduction to this widely taught material, yet illustrations of functions are sparse in current books on the topic. This is the first primary introductory textbook on complex variables and analytic functions to make extensive use of functional illustrations. Aiming to reach undergraduate students entering the world of complex variables and analytic functions, this book utilizes graphics to visually build on familiar cases and illustrate how these same functions extend beyond the real axis. It covers several important topics that are omitted in nearly all recent texts, including techniques for analytic continuation and discussions of elliptic functions and of Wiener–Hopf methods. It also presents current advances in research, highlighting the subject's active and fascinating frontier. The primary audience for this textbook is undergraduate students taking an introductory course on complex variables and analytic functions. It is also geared toward graduate students taking a second semester course on these topics, engineers and physicists who use complex variables in their work, and students and researchers at any level who want a reference book on the subject.

Acclaimed text on engineering math for graduate students covers theory of complex variables, Cauchy-Riemann equations, Fourier and Laplace transform theory, Z-transform, and much more. Many excellent problems.

Based on a series of lectures given by the author this text is designed for undergraduate students with an understanding of vector calculus, solution techniques of ordinary and partial differential equations and elementary knowledge of integral transforms. It will also be an invaluable reference to scientists and engineers who need to know the basic mathematical development of the theory of complex variables in order to solve field problems. The theorems given are well illustrated with examples.

With this second volume, we enter the intriguing world of complex analysis. From the first theorems on, the elegance and sweep of the results is evident. The starting point is the simple idea of extending a function initially given for real values of the argument to one that is defined when the argument is complex. From there, one proceeds to the main properties of holomorphic functions, whose proofs are generally short and quite illuminating: the Cauchy theorems, residues, analytic continuation, the argument principle. With this background, the reader is ready to learn a wealth of additional material connecting the subject with other areas of mathematics: the Fourier transform treated by contour integration, the zeta function and the prime number theorem, and an introduction to elliptic functions culminating in their application to combinatorics and number theory. Thoroughly developing a subject with many ramifications, while striking a careful balance between conceptual insights and the technical underpinnings of rigorous analysis, Complex Analysis will be welcomed by students of mathematics, physics, engineering and other sciences. The Princeton Lectures in Analysis represents a sustained effort to introduce the core areas of mathematical analysis while also illustrating the organic unity between them. Numerous examples and applications throughout its four planned volumes, of which Complex Analysis is the second, highlight the far-reaching consequences of certain ideas in analysis to other fields of mathematics and a variety of sciences. Stein and Shakarchi move from an introduction addressing Fourier series and integrals to in-depth considerations of complex analysis; measure and integration theory, and Hilbert spaces; and, finally, further topics such as functional analysis, distributions and elements of probability theory.

Once upon a time students of mathematics and students of science or engineering took the same courses in mathematical analysis beyond calculus. Now it is common to separate" advanced mathematics for science and engi neering" from what might be called "advanced mathematical analysis for mathematicians." It seems to me both useful and timely to attempt a reconciliation. The separation between kinds of courses has unhealthy effects. Mathe matics students reverse the historical development of analysis, learning the unifying abstractions first and the examples later (if ever). Science students learn the examples as taught generations ago, missing modern insights. A choice between encountering Fourier series as a minor instance of the repre sentation theory of Banach algebras, and encountering Fourier series in isolation and developed in an ad hoc manner, is no choice at all. It is easy to recognize these problems, but less easy to counter the legiti mate pressures which have led to a separation. Modern mathematics has broadened our perspectives by abstraction and bold generalization, while developing techniques which can treat classical theories in a definitive way. On the other hand, the applier of mathematics has continued to need a variety of definite tools and has not had the time to acquire the broadest and most definitive grasp-to learn necessary and sufficient conditions when simple sufficient conditions will serve, or to learn the general framework encompass ing different examples.

The aim of this comparatively short textbook is a sufficiently full exposition of the fundamentals of the theory of functions of a complex variable to prepare the student for various applications. Several important applications in physics and engineering are considered in the book. This thorough presentation includes all theorems (with a few exceptions) presented with proofs. No previous exposure to complex numbers is assumed. The textbook can be used in one-semester or two-semester courses. In one respect this book is larger than usual, namely in the number of detailed solutions of typical problems. This, together with various problems, makes the book useful both for self- study and for the instructor as well. A specific point of the book is the inclusion of the Laplace transform. These two topics are closely related. Concepts in complex analysis are needed to formulate and prove basic theorems in Laplace transforms, such as the inverse Laplace transform formula.

Methods of complex analysis provide solutions for problems involving Laplace transforms. Complex numbers lend clarity and completion to some areas of classical analysis. These numbers found important applications not only in the mathematical theory, but in the mathematical descriptions of processes in physics and engineering.

Classic graduate-level exposition covers theory and applications to ordinary and partial differential equations. Includes derivation of Laplace transforms of various functions, Laplace transform for a finite interval, and more. 1948 edition.

This book is intended for someone learning functions of a complex variable and who enjoys using MATLAB. It will enhance the exprience of learning complex variable theory and will strengthen the knowledge of someone already trained in ths branch of advanced calculus. ABET, the accrediting board for engineering programs, makes it clear that engineering graduates must be skilled in the art of programming in a language such as MATLAB®. Supplying students with a bridge between the functions of complex variable theory and MATLAB, this supplemental text enables instructors to easily add a MATLAB component to their complex variables courses. A MATLAB® Companion to Complex Variables provides readers with a clear understanding of the utility of MATLAB in complex variable calculus. An ideal adjunct to standard texts on the functions of complex variables, the book allows professors to quickly find and assign MATLAB programming problems that will strengthen students' knowledge of the language and concepts of complex variable theory. The book shows students how MATLAB can be a powerful learning aid in such staples of complex variable theory as conformal mapping, infinite series, contour integration, and Laplace and Fourier transforms. In addition to MATLAB programming problems, the text includes many examples in each chapter along with MATLAB code. Fractals, the most recent interesting topic involving complex variables, demands to be treated with a language such as MATLAB. This book concludes with a Coda, which is devoted entirely to this visually intriguing subject. MATLAB is not without constraints, limitations, irritations, and quirks, and there are subtleties involved in performing the calculus of complex variable theory with this language. Without knowledge of these subtleties, engineers or scientists attempting to use MATLAB for solutions of practical problems in complex variable theory suffer the risk of making major mistakes. This book serves as an early warning system about these pitfalls.

The third edition of this unique text remains accessible to students of engineering, physics and applied mathematics with varying mathematical backgrounds. Designed for a one or two-semester course in complex analysis, there is optional review material on elementary calculus. Complex Numbers; The Complex Function and its Derivative; The Basic Transcendental Functions; Integration in the Complex Plane; Infinite Series Involving a Complex Variable; Residues and Their Use in Integration; Laplace Transforms and Stability of Systems; Conformal Mapping and Some of Its Applications; Advanced Topics in Infinite Series and Products For all readers interested in complex variables with applications.

An understanding of functions of a complex variable, together with the importance of their applications, form an essential part of the study of mathematics. Complex Variables and their Applications assumes as little background knowledge of the reader as is practically possible, a sound knowledge of calculus and basic real analysis being the only essential pre-requisites. With an emphasis on clear and careful explanation, the book covers all the essential topics covered in a first course on Complex Variables, such as differentiation, integration and applications, Laurent series, residue theory and applications, and elementary conformal mappings. The reader is also introduced to the Schwarz-Christoffel transformation, Dirchlet problems, harmonic functions, analytic continuation, infinite products, asymptotic series and elliptic functions. Applications of complex variable theory to linear ordinary differential equations and integral transforms are also included. Complex Variables and their Applications is an ideal textbook and resource for second and final year students of mathematics, engineering and physics.

Linear and Complex Analysis for Applications aims to unify various parts of mathematical analysis in an engaging manner and to provide a diverse and unusual collection of applications, both to other fields of mathematics and to physics and engineering. The book evolved from several of the author's teaching experiences, his research in complex analysis in several variables, and many conversations with friends and colleagues. It has three primary goals: to develop enough linear analysis and complex variable theory to prepare students in engineering or applied mathematics for advanced work, to unify many distinct and seemingly isolated topics, to show mathematics as both interesting and useful, especially via the juxtaposition of examples and theorems. The book realizes these goals by beginning with reviews of Linear Algebra, Complex Numbers, and topics from Calculus III. As the topics are being reviewed, new material is inserted to help the student develop skill in both computation and theory. The material on linear algebra includes infinite-dimensional examples arising from elementary calculus and differential equations. Line and surface integrals are computed both in the language of classical vector analysis and by using differential forms. Connections among the topics and applications appear throughout the book. The text weaves abstract mathematics, routine computational problems, and applications into a coherent whole, whose unifying theme is linear systems. It includes many unusual examples and contains more than 450 exercises.

Topics include the complex plane, basic properties of analytic functions, analytic functions as mappings, analytic and harmonic functions in applications, transform methods. Hundreds of solved examples, exercises, applications. 1990 edition. Appendices.

This is an introduction to complex variable methods for scientists and engineers. It begins by carefully defining complex numbers and analytic functions, and proceeds to give accounts of complex integration, Taylor series, singularities, residues and mappings. Both algebraic and geometric tools are employed to provide the greatest understanding, with many diagrams illustrating the concepts introduced. The emphasis is laid on understanding the use of methods, rather than on rigorous proofs. One feature that will appeal to scientists is the high proportion of the book devoted to applications of the material to physical problems. These include detailed treatments of potential theory, hydrodynamics, electrostatics, gravitation and the uses of the Laplace transform for partial differential equations. The text contains some 300 stimulating exercises of high quality, with solutions given to many of them. It will be highly suitable for students wishing to learn the elements of complex analysis in an applied context.

This introduction to Laplace transforms and Fourier series is aimed at second year students in applied mathematics. It is unusual in treating Laplace transforms at a relatively simple level with many examples. Mathematics students do not usually meet this material until later in their degree course but applied mathematicians and engineers need an early introduction. Suitable as a course text, it will also be of interest to physicists and engineers as supplementary material.

The second edition of this comprehensive and accessible text continues to offer students a challenging and enjoyable study of complex variables that is infused with perfect balanced coverage of mathematical theory and applied topics. The author explains fundamental concepts and techniques with precision and introduces the students to complex variable theory through conceptual develop--ment of analysis that enables them to develop a thorough understanding of the topics discussed. Geometric interpretation of the results, wherever necessary, has been inducted for making the analysis more accessible. The level of the text assumes that the reader is acquainted with elementary real analysis. Beginning with the revision of the algebra of complex variables, the book moves on to deal with analytic functions, elementary functions, complex integration, sequences, series and infinite products, series expansions, singularities and residues. The application-oriented chapters on sums and integrals, conformal mappings, Laplace transform, and some special topics, provide a practical-use perspective. Enriched with many numerical examples and exercises designed to test the student's comprehension of the topics covered, this book is written for a one-semester course in complex variables for students in the science and engineering disciplines.

Suitable for advanced undergraduate and graduate students, this text presents the general properties of partial differential equations, including the elementary theory of complex variables. Topics include one-dimensional wave equation, properties of elliptic and parabolic equations, separation of variables and Fourier series, nonhomogeneous problems, and analytic functions of a complex variable. Solutions. 1965 edition.

Laplace Transforms, Numerical Methods & Complex Variables

The study of complex variables is beautiful from a purely mathematical point of view, and very useful for solving a wide array of problems arising in applications. This introduction to complex variables, suitable as a text for a one-semester course, has been written for undergraduate students in applied mathematics, science, and engineering. Based on the authors' extensive teaching experience, it covers topics of keen interest to these students, including ordinary differential equations, as well as Fourier and Laplace transform methods for solving partial differential equations arising in physical applications. Many worked examples, applications, and exercises are included. With this foundation, students can progress beyond the standard course and explore a range of additional topics, including generalized Cauchy theorem, Painlevé equations, computational methods, and conformal mapping with circular arcs. Advanced topics are labeled with an asterisk and can be included in the syllabus or form the basis for challenging student projects.

Laplace Transforms for Electronic Engineers, Second (Revised) Edition details the theoretical concepts and practical application of Laplace transformation in the context of electrical engineering. The title is comprised of 10 chapters that cover the whole spectrum of Laplace transform theory that includes advancement, concepts, methods, logic, and application. The book first covers the functions of a complex variable, and then proceeds to tackling the Fourier series and integral, the Laplace transformation, and the inverse Laplace transformation. The next chapter details the Laplace transform theorems. The subsequent chapters talk about the various applications of the Laplace transform theories, such as network analysis, transforms of special waveshapes and pulses, electronic filters, and other specialized applications. The text will be of great interest to electrical engineers and technicians.

The textbook is designed for university students studying science and engineering. I have aimed for a comparatively short book that would give a sufficiently full exposition of the fundamentals of the theory of functions of a complex variable to prepare the student for various applications.

From the algebraic properties of a complete number field, to the analytic properties imposed by the Cauchy integral formula, to the geometric qualities originating from conformality, Complex Variables: A Physical Approach with Applications and MATLAB explores all facets of this subject, with particular emphasis on using theory in practice. The first five chapters encompass the core material of the book. These chapters cover fundamental concepts, holomorphic and harmonic functions, Cauchy theory and its applications, and isolated singularities. Subsequent chapters discuss the argument principle, geometric theory, and conformal mapping, followed by a more advanced discussion of harmonic functions. The author also presents a detailed glimpse of how complex variables are used in the real world, with chapters on Fourier and Laplace transforms as well as partial differential equations and boundary value problems. The final chapter explores computer tools, including Mathematica®, MapleTM, and MATLAB®, that can be employed to study complex variables. Each chapter contains physical applications drawing from the areas of physics and engineering. Offering new directions for further learning, this text provides modern students with a powerful toolkit for future work in the mathematical sciences.

This book demonstrates how to use functions of a complex variable to solve engineering problems that obey the 2D Laplace equation (and in some cases the 2D Poisson equation). The book was written with the engineer/physicist in mind and the majority of the book focuses on electrostatics. A key benefit of the complex variable approach to electrostatics is the visualization of field lines through the use of field maps. With todays' powerful computers and mathematical software programs, field maps are easily generated once the complex potential has been determined. Additionally, problems that would have been considered out of scope previously are now easily solved with these mathematical software programs. For example, solutions requiring the use of non-elementary functions such as elliptic and hypergeometric functions would have been viewed as not practical in the past due to the tedious use of look up tables for evaluation.

Now, elliptic and hypergeometric functions are built-in functions for most mathematical software programs making their evaluation as easy as a trigonometric function. Key highlights in the book include 2D electrostatics completely formulated in terms of complex variables More than 60 electrostatic field maps Comprehensive treatment for obtaining Green's functions with conformal mapping Fully worked Schwarz-Christoffel transformations to more than usual number of problems A full chapter devoted to solving practical problems at an advanced level Detailed solutions to all end of chapter problems available on book's website Although the text is primarily self-contained, the reader is assumed to have taken differential and integral calculus and introductory courses in complex variables and electromagnetics.

The basics of what every scientist and engineer should know, from complex numbers, limits in the complex plane, and complex functions to Cauchy's theory, power series, and applications of residues. 1974 edition.

Fundamentals of analytic function theory — plus lucid exposition of 5 important applications: potential theory, ordinary differential equations, Fourier transforms, Laplace transforms, and asymptotic expansions. Includes 66 figures.

Complex numbers and direct applications -- Functions of a complex variable -- Infinite series -- Cauchy's theorem -- Cauchy integral theorem -- Laurent series and residue theorem -- Singularities and analytical continuation -- Conformal mapping -- Laplace and Fourier transforms -- Infinite product and rational fraction expansions -- Dispersion relations -- Elliptic functions and integrals -- Differential equations and special functions -- Table 1. Laplace transforms -- Table 2. Fourier transforms -- Table 3. Conformal mapping -- Appendix A. Riemann mapping -- Appendix B. Green's theorem in the plane -- Appendix C. Phragmén-Lindelöf theorems.