Preface to the Third Edition

This third edition follows the overall plan and even the specific arrangement of topics of the second edition, but there have been substantial changes in matters of detail. A considerable number of the proofs, especially in the later chapters, have been corrected, clarified, or simplified. Many of the exercises have been revised, and in many cases the exercises have been rearranged to make for greater consistency and less duplication. The mathematical roads that this new edition follows are the same as before, but we hope that the ride is considerably smoother.

We are indebted to Harold Boas and Gerald B. Folland for their extremely careful reading of the second edition in the course of their using the book as a text. They provided far more suggestions and corrections than we had any right to expect of anyone but ourselves, and to the extent that this edition is superior to the previous, it is very largely to that extent that we are in their debt. Any remaining errors are, of course, our responsibility.

Rahul Fernandez brought mathematical expertise, typesetting skills, and a great deal of patience to the daunting task of taking our heavily marked and indeed sometimes scribbled-upon manuscript of the second edition and making this third one. We are grateful to him for his efforts. We also thank the publishing staff of the American Mathematical Society for their willingness to undertake a third edition and for their support in general.

Robert E. Greene and Steven G. Krantz

Preface to the Second Edition

In this second edition, the exposition of topological matters in Chapter 11 has been revised; the prime number theorem has been given a clearer and shorter proof; and various small errors and unclear points throughout the text have been rectified.

We have been heartened by an enthusiastic response from our readers. We are indebted to many of our colleagues and students for suggestions. We especially thank Harold Boas, Robert Burckel, Gerald Folland, and Martin Silverstein, who each scrutinized the original text carefully and contributed valuable ideas for its improvement. The authors are indebted to Rahul Fernandez for carefully correcting the TEX file of the entire text.

Robert E. Greene and Steven G. Krantz

Preface to the First Edition

This book is a text for a first-year graduate course in complex analysis. All material usually treated in such a course is covered here, but our book is based on principles that differ somewhat from those underlying most introductory graduate texts on the subject.

First of all, we have developed the idea that an introductory book on this subject should emphasize how complex analysis is a natural outgrowth of multivariable real calculus. Complex function theory has, of course, long been an independently flourishing field. But the easiest path into the subject is to observe how at least its rudiments arise directly from ideas about calculus with which the student will already be familiar. We pursue this point of view both by comparing and by contrasting complex variable theory with real-variable calculus.

Second, we have made a systematic attempt to separate analytical ideas, belonging to complex analysis in the strictest sense, from topological considerations. Historically, complex analysis and topology grew up together in the late nineteenth century. And, long ago, it was natural to write complex analysis texts that were a simultaneous introduction to both subjects. But topology has been an independent discipline for almost a century, and it seems to us only a confusion of issues to treat complex analysis as a justification for an introduction to the topology of the plane. Topological questions do arise naturally, of course; but we have collected all of the difficult topological issues in a single chapter (Chapter 11), leaving the way open for a more direct and less ambivalent approach to the analytical material.

Finally, we have included a number of special topics in the later chapters that bring the reader rather close to subjects of current research. These include the Bergman kernel function, H^p spaces, and the Bell-Ligocka approach to proving smoothness to the boundary of biholomorphic mappings. These topics are not part of a standard course on complex analysis (i.e., they would probably not appear on any qualifying examination), but they are in fact quite accessible once the standard material is mastered.

A large number of exercises are included, many of them being routine drill but many others being further developments of the theory that the reader can carry out using the hints and outlines provided. One of the striking features of complex analysis is its interconnectedness: Almost any of the basic results can be used to prove any of the others. It would be tedious to explore all these implications explicitly in the text proper. But it is important, educational, and even rather entertaining for students to follow these logical byways in the exercises.

We hope that the distinctive aspects of our book will make it of interest both to student and instructor and that readers will come to share the fascination with the subject that led us to write this book.

Robert E. Greene and Steven G. Krantz