Preface

All modern introductions to complex analysis follow, more or less explicitly, the pattern laid down in Whittaker and Watson [75]. In "part I" we find the foundational material, the basic definitions and theorems. In "part II" we find the examples and applications. Slowly we begin to understand why we read part I. Historically this is an anachronism. Pedagogically it is a disaster. Part II in fact predates part I, so clearly it can be taught first. Why should the student have to wade through hundreds of pages before finding out what the subject is good for?

In teaching complex analysis this way, we risk more than just boredom. Beginning with a series of unmotivated definitions gives a misleading impression of complex analysis in particular and of mathematics in general. The classical theory of analytic functions did not arise from the idle speculation of bored mathematicians on the possible consequences of an arbitrary set of definitions; it was the natural, even inevitable, consequence of the practical need to answer questions about specific examples. In standard texts, after hundreds of pages of theorems about generic analytic functions with only the rational and trigonometric functions as examples, students inevitably begin to believe that the purpose of complex analysis is to produce more such theorems. We require introductory complex analysis courses of our undergraduates and graduates because it is useful both within mathematics and beyond. Why then do our textbooks create the opposite impression?

Ideally part II would repair some of the damage done during part I. Unfortunately the demands of the academic calendar and the ambient mathematical culture have slowly eviscerated part II. Students now are lucky to see even the most elementary properties of the Gamma function and the Weierstrass P function. The fact that these functions are important beyond the confines of complex analysis is scarcely mentioned.

What is needed is a change in emphasis and timing. Part II needs to expand again, though perhaps not to the size it had in Whittaker and Watson's day. Part I needs to contract correspondingly. More importantly though, as much as possible of part II must be presented *before* part I, so that what remains of part I is seen to be genuinely useful.

The paragraphs above describe how I think the theory of analytic functions should be presented. What follows is my attempt to implement these ideas.

The intended audience for this book is anyone who has taken a calculus course, who knows or is willing to believe the elementary theorems of real analysis given in the appendix, and who wants to learn the classical theory of analytic functions. The pace is rather fast. In compensation the book is quite short. Classical complex analysis is based on a few, very powerful, ideas. They can be presented and illustrated quite quickly, if one avoids the many possible entertaining detours along the way.

The book has been kept as self-contained as possible. The prerequisites are minimal. All the real analysis required is given in the appendix. This has not entailed any dilution of the material covered. Indeed the book goes considerably beyond the standard first-year graduate syllabus in several directions.

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