Preface

Our goal is to tell the story of the development of complex dynamics in the first half of the 20th century. We introduce the reader to the mathematics we cover through its origins in the 19th century. We then provide additional context for our work through discussions of differential equations, in particular, the relation of Henri Poincaré to the study of complex dynamics and the problem of small divisors.

The works of Pierre Fatou and Gaston Julia, and the controversial events surrounding their work, take up the middle third of our story. But the study of complex dynamics in the first half of the 20th century did not stop with Fatou and Juila's exploration of rational functions, and so we cover subsequent developments in the last third of our narrative, including the beginnings of transcendental and algebraic dynamics, as well as a detailed examination of the center problem, which culminated in 1942 with Carl Ludwig Siegel's successful solution of a small divisors problem that links complex dynamics to KAM theory.

The conclusion of our own narrative, however, does not signal the end of our book: we include numerous appendices, the bulk of which are written by mathematicians currently involved in the development of complex dynamics. Our hope is that they underscore the connections between current research and its history.

Our book ends with the usual back matter—a glossary, a detailed index and an exhaustive bibliography—but we also include four appendices of our own devising: Two contain extended biographical sketches of Fatou and Julia, and the next consists of capsule biographies of many of the other mathematicians whose work you encounter along the way. Our last appendix discusses the computer graphics we use to illustrate the works we discuss. Appendices where the author's name is not given were written by us.

Some brief comments regarding our methodology: Unless explicitly noted, translations are our own. For the sake of notational coherence, we have made very inconsequential changes in notation in some of our direct quotations. For example, most functions will be referred to as f whether or not that was the name used by the author. However, when we refer to an equation number in our quotations, you may assume the author did likewise, although obviously using a different number.

Most of the technical terms we use are introduced in the first chapter and can be located through the index where their first reference will be to their definition. Definitions of terms introduced later are indexed similarly. Bibliographical citations are keyed by the publication date and a name is added only if the citation is unclear.

We hope you enjoy our work. In the words of the great Stan Lee, we produced the kind of story we ourselves would enjoy reading.[*]

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[*]The actual quote is, "For just once, I would do the type of story I myself would enjoy reading..." (Lee [**1974**, p. 17]).