Preface

This is an amalgamation of lecture notes for various applied mathematics and mathematical physics courses I taught at the Mathematics Department, Imperial College London over the last couple of decades. I find that the theme of complex integration beautifully unites various, seemingly very different, topics in this field. While there are plenty of excellent textbooks and classical sources out there, I thought my particular teaching experience, selection of topics, and connections between them might be of interest to students and perhaps to a wider audience.

Assumed knowledge: real analysis, concepts such as limits, convergence, real integration, geometric series, and power series expansions of elementary functions. No knowledge about special functions is required, these are explained whenever the need arises.

Alexander O. Gogolin

The theory of complex functions is a strikingly beautiful and powerful area of mathematics. Some particularly fascinating examples are seemingly complicated integrals which are effortlessly computed after reshaping them into integrals along contours, as well as apparently difficult differential and integral equations, which can be elegantly solved using similar methods. The author was most proficient in this field and the purpose of this book is to summarize his vast knowledge.

We were confronted with the finalization of this book after Alexander tragically passed away in April 2011. The parts of the manuscript available were written in a very concise and clear style, that we have endeavored to emulate.

As a book written as lecture notes, in some places the reader may find it not going into much detail. For more in-depth understanding we therefore recommend a perusal of the classics, such as Refs. [1–3], alongside these notes. We have made reference to the specialized literature wherever possible, and have included a large number of examples and problems with detailed solutions.

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