
PREFACE

The majority of scientists, mathematicians and engineers must consult reference books containing information on a variety of functions. This is because all but the most mundane quantitative work involves relationships that are best described by mathematical functions of various complexities. Of course, the need will depend on the user, but most will require information about the general behavior of the function in question and its mathematical properties, as well as its numerical values at a number of arguments.

The first edition of *An Atlas of Functions*, the product of collaboration between a mathematician and a chemist, appeared during an era when the programmable calculator was the workhorse for the numerical evaluation of functions. That role has now been taken over by the omnipresent computer, and therefore the second edition delegates this duty to *Equator, the Atlas function calculator*. This is a software program that, as well as carrying out other tasks, will calculate values of over 200 functions, mostly with 15 digit precision. There are numerous other improvements throughout this new edition but the objective remains the same: to provide the reader, regardless of his or her discipline, with a succinct compendium of information about all the common mathematical functions in use today.

While relying on *Equator* to generate exact numerical values, the *Atlas of Functions* describes each function graphically and gives ready access to the most important definitions, properties, expansions and other formulas that characterize it, and its relationship to other functions. As well, the utility of the *Atlas* is enhanced by the inclusion of sections that briefly discuss important topics related to specific functions; the new edition has many more such sections. The book is organized into 64 chapters, each of which is devoted to one function or to a family of closely related functions; these appear roughly in order of increasing complexity. A standard format has been adopted for each chapter to minimize the effort needed to locate a sought item of information. A description of how the chapters are sectioned is included as Chapter 0. Several appendices, a bibliography and two comprehensive indices complete the volume.

In addition to the traditional book format, an electronic version of *An Atlas of Functions* has also been produced and may even be available through your library or other information center. The chapter content of the paper and electronic editions is identical, but *Equator, the Atlas function calculator* is not included in the latter. The *Equator* CD is included with the print version of the book, and a full description of the software will be found in Appendix C. Because *Equator* is such a useful adjunct to the *Atlas*, stand-alone copies of the *Equator* CD have been made widely available, through booksellers and elsewhere, primarily for the benefit of users of the electronic version of the *Atlas*.

Though the formulas in the *Atlas* and the routines in *Equator* have been rigorously checked, errors doubtless remain. If you encounter an obscurity or suspect a mistake in either the *Atlas* or *Equator*, please let us know at

koldham@trentu.ca, jmyland@trentu.ca or jspanier@uci.edu. An *Errata* of known errors and revisions will be found on the publisher's website; please access www.springer.com/978-0-387-48806-6 and follow the links. This will be updated as and if new errors are detected or clarifications are found to be needed. Use of the *Atlas of Functions* or *Equator*, the *Atlas function calculator* is at your own risk. The authors and the publisher disclaim liability for any direct or consequential damage resulting from use of the *Atlas* or *Equator*.

It is a pleasure to express our gratitude to Michelle Johnston, Sten Engblom, and Trevor Mace-Brickman for their help in the creation of the *Atlas* and *Equator*. The frank comments of several reviewers who inspected an early version of the manuscript have also been of great value. We give sincere thanks to *Springer*, and particularly to Ann Kostant and Oona Schmid, for their commitment to the lengthy task of carrying the concept of *An Atlas of Functions* through to reality with thoroughness, enthusiasm, skill, and even some humor. Their forbearance in dealing with the authors is particularly appreciated.

We hope you will enjoy using *An Atlas of Functions* and *Equator*, and that they will prove helpful in your work or studies.

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