Preface to the German Edition

The main topic of this book is an elementary introduction to the construction of the number systems encountered by mathematics students in their first semesters of study. Beginning with the natural numbers, we successively construct, along with the requisite algebraic machinery, all the number fields containing the natural numbers, including the real numbers, complex numbers, and Hamiltonian quaternions. Our experience has shown us that time is frequently lacking in introductory mathematics courses for a well-founded construction of number systems; this book represents a contribution toward filling that gap.

The construction of number systems also represents an important component in the professional education of mathematics teachers. For this reason, this book offers a self-contained and compact construction of the number systems that are of relevance to different grade levels from a mathematical perspective with a view toward aspects of pedagogical content knowledge.

This book arose from a course in elementary abstract algebra and number theory given a number of times at the Humboldt University of Berlin. Parts of the first-named author’s book Zahlen für Einsteiger: Elemente der Algebra und Zahlentheorie (Vieweg Verlag, Wiesbaden, 2008) have been revised and expanded for inclusion in this newly conceived book on the construction of number systems. Numerous exercises with extensive solutions facilitate the reader’s engagement with the subject.

The completion of this book would not have been possible without the contributions of many individuals. Here we wish to thank first of all Christa Dobers and Matthias Fischmann for typing the first parts of the manuscript. In addition, we wish to thank all the students whose written course notes contributed to the text. We also wish to thank our colleagues, in particular Andreas Filler and Wolfgang Schulz, for their numerous suggestions for improving early versions of the manuscript. A special word of thanks goes to Olaf Teschke for his work on creating the exercises, and we also thank Barbara Jung and André Henning for their work on writing up solutions to the exercises. Finally, we offer hearty thanks to Christoph Eyrich for his expert support in designing the layout of the book and to Ulrike Schmickler-Hirzebruch for her encouragement and support on behalf of the publisher, Springer Spektrum.

Berlin, February 2013

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From Natural Numbers to Quaternions
Kramer, J.; von Pippich, A.-M.
2017, XVIII, 277 p. 10 illus., 6 illus. in color., Softcover
ISBN: 978-3-319-69427-6