

Preface

This book surveys quandle theory, starting from basic motivation and passing on to introduce recent developments and the results of my own research. Topological applications and related topics are presented throughout. While the topological aspects are the focus, I also would like to represent how quandle theory is evaluated in mathematics. Thus, this book is a crash course in quandle theory.

The first four chapters contain what I consider to be the basics of quandles and aim to express topological objects in terms of quandles. The remaining chapters focus on studying the objects in detail from the viewpoints of homotopy theory and group cohomology. These chapters reflect my own research interests and applications. For the most part, as prerequisites for reading this book, the reader needs elements of algebra (groups, rings, modules, and homological algebra) and of algebraic topology (C^∞ -manifold, fundamental group, covering spaces, CW-complexes, and (co)-homology). However, concerning low-dimensional topology, I give a list of elementary notation and facts in Appendix A without proof; the reader can simply take these facts on faith (for the details, see the references at the end of this book).

I give a number of exercises, some of which imply arbitrary abbreviations to cut a long proof short. So I only cited references for the answers. I think that the details are not so essential in this book, or the details involve tedious computations.

In closing, I sincerely express my thanks to Toshiyuki Akita, J. Scott Carter, Katsumi Ishikawa, Ye Liu, Hirofumi Niibo, Józef H. Przytycki, Masahico Saito, Sumire Sawada, Masayoshi Tanno, and Seung Yeop Yang for careful reading earlier drafts of this book and for giving me a number of their detailed comments. I also express my appreciation to the referees for his or her useful comments. Furthermore, I gratefully thank Prof. Takeo Ohsawa with whom I have had the opportunity of working on this publication. Moreover, this book grew out of notes I wrote for two intensive courses at The University of Tokyo, and the Hokkaido University. I also thank the attending students and Profs. Nariya Kawazumi and Takuya Sakasai.

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