



# Factorization: Unique and Otherwise (CMS Treatises in Mathematics)

By Steven H. Weintraub

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The concept of factorization, familiar in the ordinary system of whole numbers that can be written as a unique product of prime numbers, plays a central role in modern mathematics and its applications. This exposition of the classic theory leads the reader to an understanding of the current knowledge of the subject and its connections to other mathematical concepts, for example in algebraic number theory. The book can be used as a text for a first course in number theory or for self-study by motivated high school students or readers interested in modern mathematics.

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## **Editorial Review**

### Review

" "Throughout the book, the exposition is crisp and self-contained, and Weintraub manages to strike a very nice balance between explicit computations and abstract theory. There are a good number of exercises, and plenty of directions one could go in after reading this book. . . . it approaches elementary number theory, a topic on which hundreds of books have been written, from a new direction. For that alone it should be rewarded, and this book has far more to offer." -Darren Glass, MAA Reviews, November 2008

"This book offers an introduction to number theory built around the concept of unique factorization. After explaining the main players (integral domains and quadratic fields), the author proves that Euclidean rings are principal ideal domains, and that these have unique factorization. This is followed up with a lengthy discussion of examples of nonunique factorization in quadratic rings. ... The exposition is very detailed, and the examples and exercises take up more space than the actual text. Thus the text is well suited for self-study by motivated students, and even as a textbook for a first course in number theory..." -Franz Lemmermeyer, *Zentralblatt MATH*, September 2009

"This very nice textbook starts with the fundamental theorem of arithmetic and heads directly to algebraic number theory presenting mainly results on quadratic number fields. ... Also Dirichlet's unit theorem is presented in a very understandable way. The book can be used as a first course in (algebraic) number theory. Many exercises lead to a deeper understanding." -A. Winterhof, *International Mathematical News*, August 2009

"The starting point of this book is the concept of unique factorisation. Using an algebraic approach, the author ... opens the door to number theory up to the level of quadratic fields, together with a moderate introduction to algebraic number theory. ... The book can ... be used for self-study ... [and] ... can also be useful for instructors seeking an algebraically oriented complement for a standard text in elementary number theory." -*EMS Newsletter*, December 2009

(mathematics, Lehigh U.) works through the concepts of factorization, an important feature of the system of natural numbers and their generalizations that can be written as a unique product of prime numbers and relates the ways in which factorization plays a key role in modern mathematics and its applications. After a fine introduction to basic notions, he covers unique factorization, the Gaussian integers, and Pell's equation, and moves on to algebraic number theory. He also offers very good appendices on mathematical induction and congruences, sets of exercises for each chapter, and examples throughout. This is well-suited for a first course in number theory or for self-study by motivated readers down to the high school level." -*SciTech Book News*, September 2008

"I do like [the author's] novel approach, and with the fact that this book is very nicely presented, with detailed explanations and many examples and exercises, it is safe to say that a first course in number theory following this book closely will be accessible and enjoyed by most second-year undergraduates and above." -*MathSciNet*, November 2008

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Mathematique, December 2008

""In this concise, well-written book, Weintraub (Lehigh Univ.) wastes no time introducing the reader to the required concepts . . . Recommended."" -*CHOICE Magazine* , February 2009"

#### About the Author

Steven H. Weintraub was born in 1951, received his PhD in mathematics from Princeton University in 1974, and is currently Professor of Mathematics at Lehigh University. A specialist in areas of geometry, topology, and algebra, he is the author of approximately 50 research papers, and has visited and lectured at numerous universities around the world. This is his sixth book.

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