Algebraic Number Theory (Springer Undergraduate Mathematics Series)

By Frazer Jarvis

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This undergraduate textbook provides an approachable and thorough introduction to the topic of algebraic number theory, taking the reader from unique factorisation in the integers through to the modern-day number field sieve. The first few chapters consider the importance of arithmetic in fields larger than the rational numbers. Whilst some results generalise well, the unique factorisation of the integers in these more general number fields often fail. Algebraic number theory aims to overcome this problem. Most examples are taken from quadratic fields, for which calculations are easy to perform.

The middle section considers more general theory and results for number fields, and the book concludes with some topics which are more likely to be suitable for advanced students, namely, the analytic class number formula and the number field sieve. This is the first time that the number field sieve has been considered in a textbook at this level.

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Editorial Review

Review

"Undergraduate mathematics students need both to develop facility with numerical and symbolic calculation and comfort with abstraction. Algebraic number theory offers an ideal context for encountering the synthesis of these goals. One could compile a shelf of graduate-level expositions of algebraic number theory, and another shelf of undergraduate general number theory texts that culminate with a first exposure to it. … Summing Up: Highly recommended. Upper-division undergraduates." (D. V. Feldman, Choice, Vol. 52 (8), April, 2015)

"In this book, the author leads the readers from the theorem of unique factorization in elementary number theory to central results in algebraic number theory. … This book is designed for being used in undergraduate courses in algebraic number theory; the clarity of the exposition and the wealth of examples and exercises (with hints and solutions) also make it suitable for self-study and reading courses." (Franz Lemmermeyer, zbMATH, Vol. 1303, 2015)

From the Back Cover

The technical difficulties of algebraic number theory often make this subject appear difficult to beginners. This undergraduate textbook provides a welcome solution to these problems as it provides an approachable and thorough introduction to the topic.

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About the Author
Frazer Jarvis obtained his PhD from the University of Cambridge under the supervision of Richard Taylor in 1995. After postdoctoral periods in Strasbourg, Durham and Oxford, he has been a lecturer at Sheffield since 1998. His research has focused on modular forms and Galois representations over totally real fields, and he is currently interested in GSp(4).

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