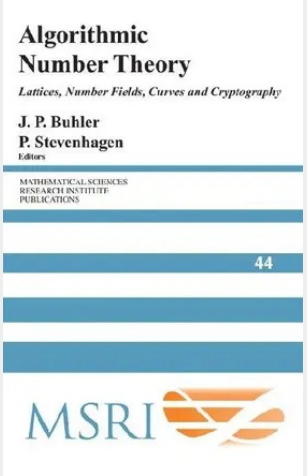
Buhler / Stevenhagen

Algorithmic Number Theory

Number theory is one of the oldest and most appealing areas of mathematics. Computation has always played a role in number theory, a role which has increased dramatically in the last 20 or 30 years, both because of the advent of modern computers, and because of the discovery of surprising and powerful algorithms. As a consequence, algorithmic number theory has gradually emerged as an important and distinct field with connections to computer science and cryptography as well as other areas of mathematics. This text provides a comprehensive introduction to algorithmic number theory for beginning graduate students, written by the leading experts in the field. It includes several articles that cover the essential topics in this area, such as the fundamental algorithms of elementary number theory, lattice basis reduction, elliptic curves, algebraic number fields, and methods for factoring and primality proving. In addition, there are contributions pointing in broader directions, including cryptography, computational class field theory, zeta functions and L-series, discrete logarithm algorithms, and quantum computing.

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