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One of the oldest, liveliest branches of mathematics, number theory is noted for its theoretical depth and applications to other fields, including representation theory, physics, and cryptography. The forefront of number theory is replete with sophisticated and famous open problems; at its foundation, however, are basic, elementary ideas that can stimulate and challenge beginning students. This introductory textbook takes a problem-solving approach to number theory, situating each concept within the framework of an example or a problem for readers to solve. Starting with the essentials, the text covers divisibility, unique factorization,
modular arithmetic and the Chinese Remainder Theorem, Diophantine equations, binomial coefficients, Fermat and Mersenne primes and other special numbers, special sequences, and problems of density. Included are sections on mathematical induction and the pigeonhole principle, as well as a discussion of other number systems. By emphasizing examples and applications, and by introducing and reinforcing every idea with an exercise, the authors motivate and engage readers. The exposition proceeds incrementally from first principles, starting with the natural numbers and then intuitively and rigorously uncovering deeper properties. A comprehensive index and selected solutions complete the work. Written by a team of distinguished research mathematicians and renowned teachers, "Number Theory and Its Mathematical Structures" will appeal to senior high school and undergraduate students and instructors. It is a clear, accessible introduction to the subject and a source of fascinating problems and puzzles for readers at all levels.