Number Theory and Cryptography: A Comprehensive Study

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Abstract: *Number theory, one of the oldest branches of mathematics, plays a crucial role in modern cryptography, providing the theoretical foundation for securing digital communication. This research paper explores the intersection of number theory and cryptography, examining how mathematical concepts such as prime numbers, modular arithmetic, and elliptic curves are applied to create robust encryption algorithms. By analyzing key cryptographic methods and their mathematical underpinnings, this study aims to demonstrate the critical importance of number theory in ensuring data security in the digital age.*

Keywords: Number theory