

Attention has been paid mostly to the new deterministic algorithm for primality testing AKS recently. However, probabilistic algorithms remain an efficient tool for primality testing. Our thesis focuses mostly on two most well-known probabilistic algorithms for primality testing. It describes the main idea and gives proofs of correctness of Solovay-Strassen and Rabin-Miller algorithms. Apart from that, it also tries to look at the subject of probabilistic algorithms from a wider perspective. It presents a definition of a probabilistic algorithm and various complexity classes that correspond to Monte Carlo or Las Vegas algorithms. Besides pure mathematical theory, we mention also some philosophical aspects that need to be considered when we decide to use the probabilistic method.