FACULTY
OF INFORMATION
TECHNOLOGY
CTU IN PRAGUE

ASSIGNMENT OF MASTER'S THESIS

Title:	Summation polynomials and the discrete logarithm problem on elliptic curve
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Study Programme:	Informatics
Study Branch:	Computer Security
Department:	Department of Information Security
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Instructions

Discrete logarithm problem (DLP) is a fundamental problem arising in modern cryptography. While there exist subexponential algorithms that solve DLP in multiplicative groups of finite fields, no such algorithms are known for groups of points of elliptic curves (ECDLP). Attempts to develop index calculus methods for elliptic curves include so called summation polynomials that give algebraic relations whose solution may give a solution of ECDLP.

The goal of the thesis is to get acquainted with cryptography of elliptic curves, give thorough description of the state of the art of the summation polynomial algorithm, implement it in suitable language and test its performance. Student will focus on available methods of effective generation and solution (Groebner basis and other methods) of algebraic relations appearing in the algorithm.

References

[1] I. Semaev, New algorithm for the discrete logarithm problem on elliptic curves, Cryptology ePrint Archive, Report 2015/310
[2] S. D. Galbraith and S. W. Gebregiyorgis, Summation polynomial algorithms for elliptic curves in characteristic two, Cryptology ePrint Archive, Report 2014/806

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