⋆ **Evaluation of series : fastness and precision**

Prerequisite : (Floating points, basic complexity in arithmetics)

Numerical evaluation of series with rational terms is a crucial task : logarithm, hypergeometric functions, many special functions can be evaluated this way. How can we do this efficiently ?

Abstract :

In this PIR project, we would like to understand and implement advanced techniques for the evaluation of such functions :

— binary splitting.

— Brent's algorithm.

— bit burst.

The first idea is that, even when doing the same number of arithmetic operations, an algorithm that mostly performs operations on small integers, and only a little bit of big ones at the end, will be faster than one doing only operations on big integers.

We would like to have a precise analysis of those two strategies for evaluation of series.

References :

R. P. BRENT. *The complexity of multiple-precision arithmetic* ;

D. V. CHUDNOVSKY, G. V. CHUDNOVSKY. *Computer algebra in the service of mathematical physics and number theory* ;

Bruno HAIBLE, Thomas PAPANIKOLAOU. *Fast multiprecision evaluation of series of rational numbers* ;

Marc MEZZAROBBA. *Autour de l'évaluation numérique des fonctions D-finies* ;