PUBLICATION LIST

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(1) Quadratic forms that represent almost the same primes, math.NT/0410266, submitted to Math. Comp.

Jagy and Kaplansky exhibited a table of 68 pairs of positive definite binary quadratic forms that represent the same odd primes and conjectured that their list is complete outside of “trivial” pairs. In this article, we confirm their conjecture, and in fact find all pairs of such forms that represent the same primes outside of a finite set.


In this article, we discuss basic algorithmic problems for quaternion algebras over number fields. We describe many of the known results and provide several new algorithms. The paper treats three main topics: determination if a quaternion algebra is isomorphic to a matrix ring, computation of a maximal order, and calculation of the group of units and a representative set of ideal classes.

(3) Computing CM points on Shimura curves arising from compact arithmetic triangle groups, in preparation.

We apply algorithms for Shimura curves which are quotients of the upper half-plane by arithmetic compact triangle groups arising from the unit groups of indefinite quaternion algebras. We present fast methods for computing the value of hypergeometric series to large precision and show how to apply the Shimura reciprocity law to compute CM points to high precision as complex numbers and recognize them as putative algebraic numbers by also computing their Galois conjugates. We give some examples of how these algorithms work in practice and show how to construct the canonical polynomial for a Shimura curve.


The material in this thesis has been rewritten to encompass the three articles above.


The number of points on a curve defined over a finite field is bounded as a function of its genus \( g \). In this introductory article, we survey what is known about the maximum number of points on a curve of genus \( g \) defined over \( \mathbb{F}_q \), including an exposition of upper bounds, lower bounds, known values of this maximum, and briefly indicate some methods of constructing curves with many points, providing many references to the literature.


It is proven in this article that an odd perfect number with eight distinct prime factors is divisible by 5.