



Analogies of Theories of Algebraic Fields in Function Fields with one valuable

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● Research Outline

Analogies of Dedekind Sums

Function fields of one valuable over finite fields has similar properties to rational number field and algebraic fields (extensions of rational number field). Especially about theories of cyclotomic fields and these class numbers, many mathematician studied analogies over function fields.

Kummer showed the close relationships between Bernoulli numbers and class numbers of cyclotomic fields using differentials of logarithmics of functions. About algebraic function fields, there are similar numbers (Bernoulli-Carlitz numbers) to Bernoulli numbers, similar fields to cyclotomic fields and these class numbers. I showed similar relationship between “Bernoulli number” and class numbers of “cyclotomic fields” at algebraic function fields cases.

Dedekint studied Dedekind sums. These sums appeared in function equalities with eta functions. He showed the reciprocity laws of Dedekind sums. I considered analogies of Dedekind sum over algebraic function fields and show reciprocity law. But, about analogies of eta functions and these function equalities is unknown.

m-dimensional Queens Problems

Placing 8 queens on a chessboard so that no two queens attack to each other is the famous 8 queens Problem. This Problem has 92 solutions. n queen problem is the problem changing the size of chessboard to n times n and also numbers of queens to n. This problem has solutions for n more than 4.

I considered changing chessboard to 3-dimension “board”, so n times n times n. And queen is changed to attack all directions (26 direction). So we can consider the 3-dimensional n-queens problems. And similarly we can consider m-dimensional n-queen problems.

I showed no solution about cases that n is smaller than the m-th power of 2. And also I showed a solution about cases n is prime and n is grater than the m-th power of 2.

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