

GAUSS SUMS

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Abstract

The aim of this seminar is to present *Gauss sums* and some their applications. We will start introducing *characters*, which are essential in order to define Gauss sums. At the beginning, we will study the case of Gauss sums over $\mathbb{Z}/q\mathbb{Z}$ and $\mathbb{F}_p$. As application, we will evaluate the number of solutions of some equations over $\mathbb{F}_p$. Consequently, we will need to introduce *Jacobi sums* and their main connections to Gauss sums. Finally, we will discuss a more algebraic aspect of the matter, namely the *Stickelberger's Theorem*. In this way we will observe that Gauss sums can be used to deduce arithmetic properties.

References

1. Serge Lang: *Algebraic Number Theory*, 1994, Springer
2. Tom M. Apostol: *Introduction to Analytic Number Theory*, 1976, Springer
3. Kenneth Ireland And Michael Rosen: *A Classical Introduction to Modern Number Theory*, 1990, Springer
4. Yuri F. Bilu, Yann Bugead, Maurice Mignotte: *The Problem of Catalan*, 2014, Springer