ALGEBRAIC CURVES, ARCS, AND CAPS OVER FINITE FIELDS

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INTRODUCTION

These notes give an account of a series of lectures at the University of Lecce as well as two at the University of Bari, all during April 1986.

§§1-15 are based on the thesis [18], of J.-F.Voloch, apart from some background remarks and classical interpolations. They deal with the number of points on an algebraic curve over a finite field. The main results of the thesis are also contained in [14], §16 records some classical results on elliptic curves and §17, following Voloch [19], proves the existence of complete k-arcs for many values of k by taking half the points on an elliptic curve. §§18-19 discusses the values of n(2,q), the size of the smallest k-arc in PG(2,q), and m'(2,q), the size of the second largest complete k-arc in PG(2,q), the main result of §19 follows a proof of Segre using an improved bound for the number of points on a curve from §§11 and 14. Finally, §20 summarizes the best, known estimates for $m_2(d,q)$, the largest size of k-cap in PG(d,q).