1009-05-81 **Jacques Verstraete*** (`jverstra@math.uwaterloo.ca`), Faculty of Mathematics, University of Waterloo, Waterloo, N2L 3G1, Canada. *Product Representations of Polynomials.*

In this talk I will discuss the algorithmic problem of efficiently determining the existence of a linear dependence amongst a set of vectors in a finite dimensional vector space over F_q. To do so, a more general framework is introduced, where we look for integer factorizations of points in the value set of a polynomials.

For a polynomial $f \in Z[X]$ and positive integers k and N, let $\rho_k(N;f)$ denote the maximum size of a set $A \subset \{1,2,\ldots,N\}$ such that no product of k distinct elements of A is in the value set of f.

Using a little algebraic geometry, the probabilistic method and some extremal combinatorics, we prove that for every polynomial f of prime degree d, either $\rho_k(N;f)$ is linear in N, or $|f|$ is the d^{th} power of a monic linear polynomial and $\rho_k(N;f) \sim c\pi(N) + O(N^{1-1/2d})$ and c is completely determined. This generalizes earlier results of Erdős (1963), Erdős, Sós and A. Sárközy (1995), Györi and G. Sárközy (1997). We conclude with some open questions. (Received August 07, 2005)