

UNIVERSITY OF DELAWARE
DEPARTMENT OF MATHEMATICAL SCIENCES
DISCRETE MATHEMATICS SEMINAR

Friday Feb. 28, 2003, 3:45pm, Room 436 Ewing Hall

**A theorem on the incidence
relations between linear
subspaces of a finite vector
space.**

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Let L_r denote the set of r -dimensional subspaces of a finite vector space. There are several natural notions of incidence relation between L_r and L_s . The topic of this talk will be the relation of nonzero intersection.

Using the modular representation theory of the general linear group, we obtain formulae for the p -ranks for all r and s .

Finally, we apply these formulae to the following combinatorial question raised by E. Shult and J. Thas. Fix n and $e < n$. In a finite vector space of dimension n over $\text{GF}(q)$, consider a family W_1, \dots, W_k of e -dimensional subspaces and a family U_1, \dots, U_k of subspaces of complementary dimension $(n - e)$, with the properties that $W_i \cap U_j \neq 0$ iff $i = j$. How large can k be?