

Combinatorial methods, 2010

Problem 1. The proof of Bollobás's theorem on subspaces uses the fact that we can factor out by a subspace in general position. This requires that the field is infinite. How can we prove the finite field version of the theorem? (Hint: Reduce to the infinite field version)

Problem 2. Let V be an n dimensional vectorspace over the field with p elements (p is prime). Show that the size of a minimal vector set intersecting all affine hyper planes is equal to one plus the minimal number of affine hyperplanes such that their union is equal to $V \setminus \{0\}$.