

# Finite Geometry

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## Problems

A projective plane  $\text{PG}(2, q)$  over the field  $\mathbf{F}_q$  has  $q^2 + q + 1$  points,  $q^2 + q + 1$  lines,  $q + 1$  points on a line and  $q + 1$  lines through a point.

Any linear code of dimension 3 corresponds to a configuration in such a plane.

What is the maximum number of points in a subset of the plane with no 3 points on a line?

Characterise such a set with this number of points.

Consider the same problem for sets with at most  $r$  points on a line.