Assignment 4.

Q.1 Let V be an n-dimensional vector space. Let $(X, \mathcal{L})$ be the incidence structure whose points are k-dimensional subspaces & lines are $(k+1)$-dimensional subspaces. Prove that $(X, \mathcal{L})$ satisfies Pasch Axiom.

Q.2 Let $(X, \mathcal{F})$ be a combinatorial geometry. Let E, F be two flats.
Prove that (a) $E \subseteq F$ & $rk\, E = rk\, F \Leftrightarrow E = F$

(b) F covers E iff $E \subset F$ & $rk\, F = rk\, E + 1$.

Q.3 Prove that $\mathbb{P}G_n(\mathbb{F})$, the projective space over a field $\mathbb{F}$, is a projective geometry.

Q.4 Prove that a finite modular geometry is a union of two flats iff it is a disjoint union of two flats.