11)

12) If $v = (a,b)$ then, since $\mathbb{Z}_3$ is a field, we can divide by a (if $a \neq 0$) to obtain

$$\hat{v} = (1, b/a)$$

But then if $p = x + sv$ then

$$p = x + (sa)\hat{v}$$ as well.

And vice-versa.

13) Four slopes: $0, 1, 2, \infty$.

14) Four lines thru origin, one for each slope.

15) Four points at ∞, one for each slope

$9 + 4 = 13$ points total in $\mathbb{Z}_3 P^2$.

16) Two additional lines parallel to each line in $(\mathbb{Z}_3)^2$.

17) $3 \cdot (4) = 12$ lines in $\mathbb{Z}_3 P^2$

parallel copies

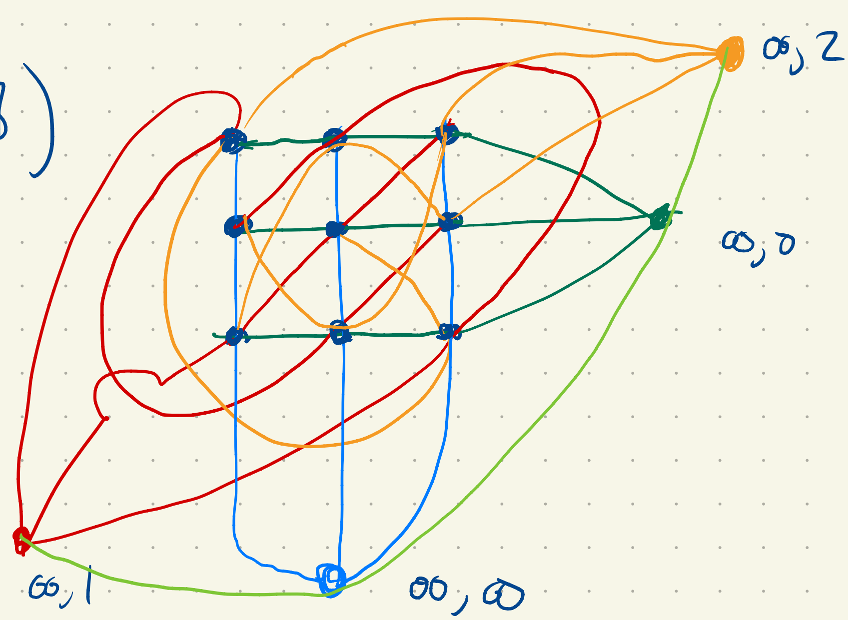
lines thru 0

Add one line at infinity

for 13 lines in $\mathbb{Z}_3 P^2$.

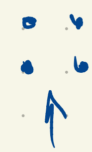
(13 points, 13 lines, duality!)

18)



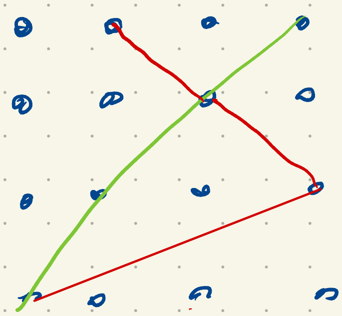
By staring, axioms 1, 2 are clear.

For four points, no three colinear, use $(0,0)$ $(0,1)$ $(1,0)$ $(1,1)$



lower left corner.

19)



Two lines that intersect twice