Biplab Das

Unable to understand about homogeneous coordinate in projective geometry.

$$X_1^2 + X_2^3 + X_3 = 5$$

homogenization

$$X_0 X_1^2 + X_2^3 + X_0^2 X_3 - 5 X_0^3 = 0$$

$$X_2^3 = 0$$

$$X_2 = 0$$

$$X_1 \rightarrow X_1/X_0 \qquad X_2 \rightarrow X_2/X_0 \qquad X_3 \rightarrow X_3/X_0$$

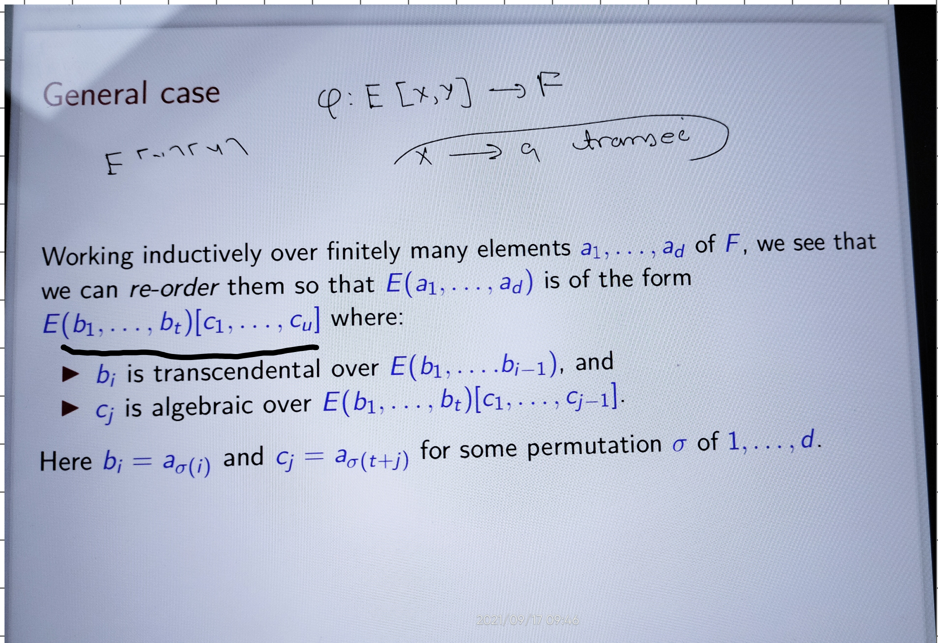
Asymptotic points

a clear denominator

$\rightarrow X_0 = 0 \rightarrow$ Points at ∞. !

Biplab Das

Unable to find any preciseness here. Will you please elaborate this today.



$a_1, \dots, a_d$

$\underline{E(a_1)}$

Sayan Chattopadhyay

This is primarily motivated from one of the discussions that happened in class.

One can think of the difference between affine space and vector space in another way. Consider a vector space V, this comes with an additive group of the vector space (which I also denote by V). So one defines an affine space A associated to this vector space as the set of "points" on which the group V acts by translation (this is free and transitive), and given two points in the affine space, say p,q , there is a unique vector w of V such that p - q = w

So in a certain sense, this construction of the affine space shows how an affine space forgets the origin and only remembers the difference between two distinct points. A naive motivation would be to think of the affine space as physical points and the vector space associated as direction vectors(maybe velocities?) between points. A concrete concept here is that of G-torsor, where G is a group. An affine space is then a V-torsor

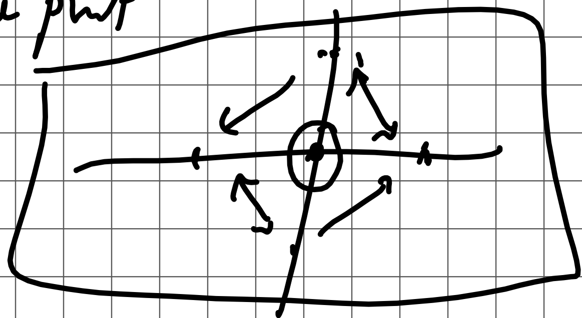
I was wondering if there could be such a similar interpretation of the projective space as some kind of a torsor?

~~Hog~~ $\boxed{\text{Homogeneous space} = \mathbb{P}^n}$ $V(X, Y; X, Y)$

"every point is like any other point"

Affine space

$(V, 0)$



Prakash Joshi

the main Problem with me in folliwing this week lecture's is that i can not understand what exactly an affine scheme is . by its definition as in class ;Z- affine scheme is simply a collection of polynomial f1,f2,.....fq in variable x1,X2,......xp .

means it is simply a subset of Z[x1,......,xp]. so why we considering it seprately and not as a subset. so what is intresting point for definig this?

$X = \mathbb{A}(x_1,\dots,x_p; f_1,\dots,f_q)$ – Conceptually we think of solutions of $f_1 = \dots = f_q = 0$ of the form $(a_1,\dots,a_p)$ lying in some ring R $= \mathbb{R}$

"Shape"/Geometry of a subset of R^p $\quad R \overset{?}{=} \mathbb{F}_7$

$\mathbb{C}$

$\mathbb{Q}$

$\mathbb{Z}$.

Geometry is understood by looking at algebraic morphisms. $Y \to X$ for various Y

Groups (G, e, i, μ) – discrete.

Topological group ; Algebraic groups.

$X =$ "Totality of R-points for every R"

$R \to S$

$X(R) \subset X(S)$

$\mathbb{F}_p \not\subset \mathbb{Z}$

$X(\mathbb{F}_p) \not\subset X(\mathbb{Z})$

(1) Is Z-~~ro~~ affine scheme is just a way of ~~nothing~~ notation.

since it's definition ~~say~~ ~~and~~ ~~ys nothing~~ its collection of polynomial $f_1, f_2, \ldots f_q$ in variable $x_1, \ldots x_p$.

simply saying that is it subset of polynomial ring $Z[x_1, x_2, \ldots x_p]$

(2) ~~Can you~~ 9n lecture (4) ~~we try to~~ understand R - point.

$\boxed{X(R)}$. Can you explain it again when R = finite field F_q ~~over the field F_p~~

where $q = p^r$

Kirti Taneja

Can you elaborate about solutions of algebraic equations in finite rings? When we look at p-tuples of commuting matrices that satisfy the system of equations, can we gain some additional information (by looking at trace or other properties of matrices)?

Algebraic properties of rings.

$\mathbb{F}_{27} \longleftrightarrow \mathbb{F}_3$

We can't $\boxed{\text{draw}}$ a "picture"

$\mathbb{R}$ or $\mathbb{C}$ can draw a "picture"

Lines $\subset A^4(x, y, z, w;\ xy - zw = 0)$ $\ni (a, b, c, d)$

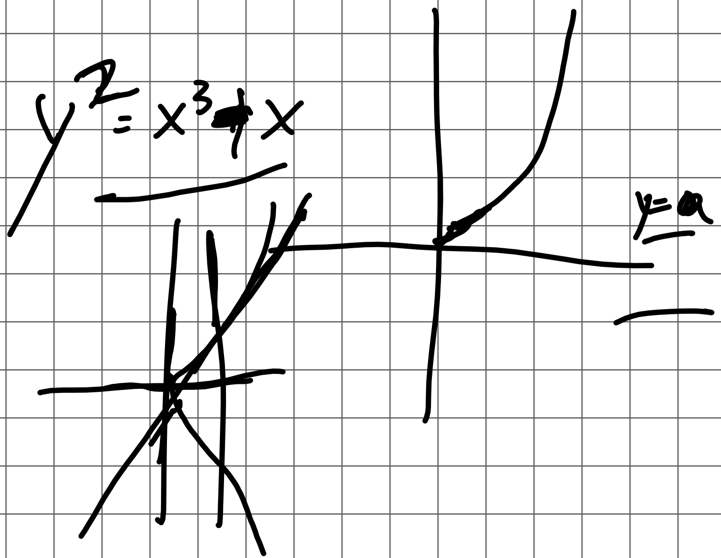
$A(x, y, z, w;\ xy - zw = 1)$ also contains lines.

R.p $= L \subset \mathbb{R}^4$

$$\boxed{x = a \quad z = b \quad ay - bw = 1}$$

Ruled Surfaces = "curved" surfaces made up of lines.

$y^2 = x^3 + x$



(Counting points of intersection

Different points behave differently)