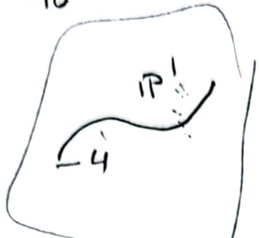
$$E_i^2 = -1 \qquad C'^2 = 6^2 - 10 \cdot 2^2 = -4$$

$$C' = \pi^* C - 2 \sum E_i$$

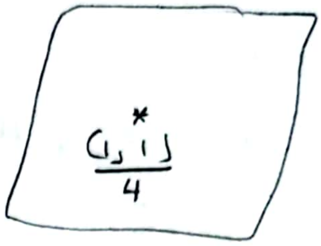
$$C', E_1 \dots E_{10}$$

$$\cap$$

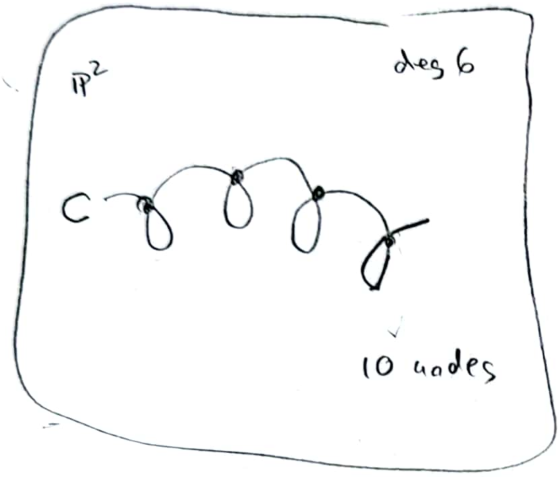
$$Bl_{10}\mathbb{P}^2 = \tilde{S}$$



$\longrightarrow S$



$$\downarrow$$



10 pts in $\mathbb{P}^2$ mod $PGL(3)$

$$(\mathbb{P}^2)^{10} \,{}^{ss} / PGL(3)$$

$$20 - 8 = \boxed{12}$$

$$\dim \left\{ \begin{matrix} \text{sextics in} \\ \mathbb{P}^2 \end{matrix} \right\} = \binom{6+2}{2} - 1 = 27$$

$$\# \begin{matrix} \text{mons deg } d \\ \text{in } \mathbb{P}^n \\ (n+1) \text{ vars} \end{matrix} = \binom{n+d}{n} = \binom{n+d}{d}$$

$$|-K_{\tilde{S}}| = \emptyset$$

$$\emptyset \neq |-2K_{\tilde{S}}| \ni^{\exists!} D = \sum C_i$$

$$\neq.$$

$$\sum_{i=1}^{10} E_i$$

$$(-2K_{\tilde{S}})^2 = 4K_{\tilde{S}}^2 = -4$$

$$K_{\tilde{S}} = \pi^* K_{\mathbb{P}^2} + \sum_{i=1}^{10} E_i$$

$$-2K_{\tilde{S}} = \pi^*(-2K_{\mathbb{P}^2}) - 2\sum_{i=1}^{10} E_i$$

$$= \pi^*(C) - 2\sum E_i = C'$$

$$K_{\tilde{S}}^2 = 9 - 10 = -1$$

$$|-2K_{\tilde{S}}| \subset |-2K_{\mathbb{P}^2}|$$

\# conditions that C has a double pt at p : 3 $\qquad c_0 + c_1 x + c_2 y$

$$27 - 3 \cdot 10 = -3$$

$$\int_0^3 \rho^4\, d\rho = \frac{\rho^5}{5}\Big|_0^3 = \frac{3^5}{5}$$

$$\int_0^{\pi/3} \sin^3\varphi\, d\varphi = \int_1^{1/2} (1-u^2)(-du) = \int_1^{1/2} (u^2-1)\, du =$$

$u = \cos\varphi$

$du = -\sin\varphi\, d\varphi$

$\cos 0 = 1 \qquad \cos\frac{\pi}{3} = \frac{1}{2}$

$$= \frac{u^3}{3} - u\Big|_1^{1/2} = \frac{1}{24} - \frac{1}{2} - \frac{1}{3} + 1$$

$$\int_0^{2\pi} \cos^2\theta\, d\theta = \frac{1}{2}\int_0^{2\pi} (1+\cos 2\theta)\, d\theta = \frac{1}{2}\left[\theta + \frac{\sin 2\theta}{2}\right]_0^{2\pi} = \pi$$

K3

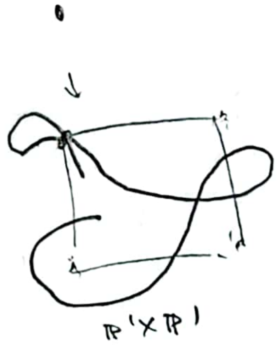
$X \longrightarrow$ Cable $Z \ni B_Z$

$\downarrow \qquad\qquad \downarrow$

$Y \longrightarrow W$ $\cap B_W$ dP_4 with 4 A_1 sings

$\mathbb{P}^1\times\mathbb{P}^1$ gen'lly

$= \dfrac{\mathbb{P}^1\times\mathbb{P}^1}{\pm 1}$



$\mathbb{P}^1\times\mathbb{P}^1$

y^2

$y \qquad xy$

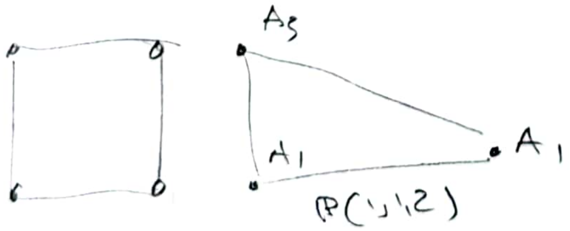
$1 \qquad x \qquad x^2$

Z

$\dfrac{(1,1)}{4}$

locally: $B \quad x^2+y^2=0$

$X \quad z^2+x^2+y^2 \quad A_1$ sing.



A_3

A_1

A_1

$\mathbb{P}(1,1,2)$

$$2L_Z = 2(L_Z + K_Z)$$

For Enr:

$X \xrightarrow{\psi} Z$ unramif.

$0 = \psi^* K_Z$

$\psi^* L_Z = \psi^*(L_Z + K_Z)$

$X \qquad L = \pi^*\mathcal{O}(1,1) = \psi^* L_Z \qquad L_Z^2 = 2$

deg 4

For Cable: $X \xrightarrow{\psi} Z$ ramif.

$\Rightarrow \exists!\, L_Z$

$Y \qquad \mathcal{O}(1,1) \quad$ deg 2

Q: Is L_Z Cartier? or any Weil?
Or only $2L_Z$ is Cartier?

$$D_{E_n} = D(N) \supset D(N_{Co})$$

$$L^-_{E_n} = N_{E_{nr}} = U + U(2) + E_8(2) \qquad N_{Co} =$$

$$L^+_{E_n} = M = U(2) + E_8(2)$$

$$L_{K3} = U^3 + E_8^2 \quad (22, 0, 0)_3$$

$$(11, 11, 1)_1^\perp$$

$$I_{1,10}(2)^\perp$$

$$\|$$

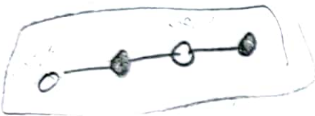
$$(11, 11, 1)_2^\perp$$

$$\|$$

$$\boxed{\langle 2 \rangle + U(2) + E_8(2)}$$

$$\mathrm{Pic}\, \tilde{S} = \langle E_0, E_1, \ldots E_{10} \rangle = I_{1,10}$$

$$\underset{+1}{\mathbb{Z}} \oplus \underset{-1}{\mathbb{Z}^{10}}$$



$$\mathrm{Pic}\, \mathrm{Bl}_p S = \mathrm{Pic}\, S \oplus \mathbb{Z}E$$

F_2

K3 deg 2

$\supset$

F_2, unigonal Heegner div.

$\times$

$\mathbb{P}^2$

deg 6

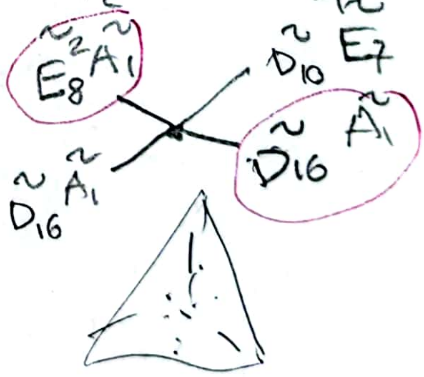
$L^2 = 2$

$S^2 = -2$

$L = S + 2f$

$L^2 = -2 + 4 = 2$

F_2 $\exists !$ 0-cusp, 4 1-cusps



$F_{4,he} \longrightarrow F_4$ $\exists ! \; 1$ 0-cusp

2 0-cusp