

Oral Exam Questions - David Favero (2006)

Algebraic Geometry

- 1) Consider $y^2 = ax^3 + bx^2 + cx + d$ and homogenize. Which schemes in \mathbb{P}^2 occur in this family?
- 2) How many degree 2 morphisms are there onto a given curve C (any range) with fixed ramification D . How many top 2-fold covers are there of $C \setminus D$. What is the relationship?
- 3) Does a hyperelliptic curve have a g_3^1 ? When is a $g_m^n + P$ a g_{m+1}^{n+1} ? What is the image of a hyperelliptic curve under the canonical divisor?
- 4) Give a Big Divisor that is not Cartier.

Model Theory

- 1) Prove that “ R is noetherian” is not 1st order in $\mathcal{L}_{\text{rings}}$.
- 2) Show that if $\phi : \bar{k}^n \rightarrow \bar{k}^n$ is an injective morphism then ϕ is surjective. (\bar{k} means use an algebraically closed field)