

HW 8
Math 672

Due Mon, Nov 14. in class.

0. Read Chapter 7.

1. (The first part of 6.2.1) If $V = \mathbb{V}(F_1, \dots, F_r)$ is an affine variety in \mathbb{A}^n , then the tangent bundle TV is a subvariety of $\mathbb{A}^n \times \mathbb{A}^n$. Find the equations defining TV in $\mathbb{A}^n \times \mathbb{A}^n$. You should label your coordinates of $\mathbb{A}^n \times \mathbb{A}^n$ as $(x_1, \dots, x_n, y_1, \dots, y_n)$. Do the case $r = 1$ first.

2. 7.3.1

3. Recall that the Cremona transform is the rational map $\phi : \mathbb{P}^n \dashrightarrow \mathbb{P}^n$ defined as

$$[x_0 : \dots : x_n] \mapsto [1/x_0 : \dots : 1/x_n].$$

Find equations defining the graph of ϕ as a subvariety of $\mathbb{P}^n \times \mathbb{P}^n$.

4. Let B be the blowup of \mathbb{P}^2 at the point $[0 : 0 : 1]$. Find equations defining B as a subvariety of $\mathbb{P}^2 \times \mathbb{P}^1$. Show that there is a morphism (defined everywhere) from B to $\mathbb{P}^1 \times \mathbb{P}^1$.

5. 7.5.1