



Exercises Algebraic Geometry

Winterterm 2016/17

The solutions are collected on Tuesday, before the exercise session.

All further informations concerning the lecture can be found here: <https://www.math.uni-sb.de/ag/schreyer/index.php/teaching>

Sheet 12

30.01.2017

Exercise 1 (6.4.29). Let $C \subset \mathbb{P} \times \mathbb{P}^1$ be a hypersurface of bidegree (a, b) . Show that C has degree $\deg C = a + b$ and arithmetic genus $p_a(C) = (a - 1)(b - 1)$.

Exercise 2. Let

$$\rho_{n,d} : \mathbb{P}^n \rightarrow \mathbb{P}^{\binom{d+n}{n}-1}$$

be the d -uple embedding and let

$$\sigma_{m,n} : \mathbb{P} \times \mathbb{P}^m \rightarrow \mathbb{P}^{(n+1)(m+1)-1}$$

be the Segre embedding. Compute $\deg(\rho_{n,d}(\mathbb{P}^n))$ and $\deg(\sigma_{m,n}(\mathbb{P} \times \mathbb{P}^m))$.

Exercise 3 (6.4.38). Show that every associated prime of a graded module is homogeneous.

Exercise 4 (6.4.39). Let

$$0 \rightarrow M' \rightarrow M \rightarrow M'' \rightarrow 0$$

be a short exact sequence. Prove:

$$\text{Ass}(M') \subset \text{Ass}(M) \subset \text{Ass}(M') \cup \text{Ass}(M'').$$