Humboldt Universität zu Berlin February 1, 2010
Algebraic Geometry I
Lectures by Prof. Dr. R. N. Kloosterman
Exercises by N. Tarasca

Exercise Sheet 13

Hand in solutions not later than Monday, February 8.

Exercise 1. *i)* Prove that the intersection of three general quadrics in $\mathbb{P}^3$ consists of eight points in general position.

ii) Prove that eight points in general position impose only seven conditions on quadrics in $\mathbb{P}^3$.

Exercise 2. Let X to be the union of d lines in general position in $\mathbb{P}^2$.

i) Find a closed formula to express the number $\sigma(d)$ of singular points of X.

ii) Show that $\sigma(d) > \binom{d-1}{2}$.

Exercise 3. Find the degree of the Segre variety.

Exercise 4. Consider the plane cubic curve $y^2z = x^3 - xz^2$ with base point $[0 : 1 : 0]$.

i) Determine the sum $[-1 : 0 : 1] + [0 : 0 : 1]$.

ii) Determine $2 \cdot [1 : 0 : 1]$.

iii) Determine $[-1/4 : \sqrt{15}/8 : 1] + [2 : \sqrt{6} : 1]$.