March 25. 2016

18.721 Assignment 6

This assignment is due Friday, April 1.

1. Classify quadrics, hypersurfaces of degree two, in $\mathbb{P}^3$.

2. Prove that version 4 (3.2.7) of the Nullstellensatz implies version 1 (2.4.1).

3. Consider the double plane $w^2 = F(u_1, u_2)$, where F is a generic cubic polynomial. Since the degree of the homogenization $f(x_0, x_1, x_2)$ of F is odd, one must add a factor x_0, and write $y^2 = x_0 f(x_0, x_1, x_2)$ to construct a projective double plane. Determine the number of lines in $\mathbb{P}^2$ that split in this projective double plane.

4. Prove Lemma 4.6.20.