HW 6
Math 672

Due Fri, Oct. 14 in class.

0. Read Chapter 5.

1. Let H be a hyperplane in $\mathbb{P}^n$, i.e. H is defined as the vanishing locus of a linear equation $\mathbb{V}(a_0x_0 + \cdots + a_nx_n)$ for some constants $a_0, \ldots, a_n$. Prove that H is isomorphic to $\mathbb{P}^{n-1}$. (Also, you don't need to prove it, but you should be comfortable with the fact that $\mathbb{P}^n \setminus L$ is isomorphic to $\mathbb{A}^n$.)

2. Let $\nu_2 : \mathbb{P}^2 \to \mathbb{P}^5$ be the Veronese embedding of degree 2. Write out equations defining the image of ν_2.

3. Recall that $\mathbb{P}^5$ parametrizes the space of all conics in $\mathbb{P}^2$. Show that the image of the Veronese embedding $\nu_2 : \mathbb{P}^2 \to \mathbb{P}^5$ is exactly those conics which are "double lines." (hint: if $L = \mathbb{V}(ax + by + cz)$, what is the (degree 2) equation of the associated double line).

4. 5.2.1