

Math 465 Assignment 9: Due Monday, November 14

Do problems 9.4 and 9.5

1) Consider the ideal

$$I = \langle y_2 - y_1^2, y_3 - y_1y_2, \dots, y_n - y_1y_{n-1} \rangle = \langle y_{i+1} - y_1y_i, i = 1, \dots, n-1 \rangle.$$

Show that the homogenization of I is generated by the 2×2 minors of the matrix

$$\begin{pmatrix} x_0 & x_1 & \dots & x_{n-1} \\ x_1 & x_2 & \dots & x_n \end{pmatrix}.$$

2) Let $J \subset k[x_0, \dots, x_n]$ be a homogeneous ideal. Let I_i denote the dehomogenization of J with respect to x_i , J_i the homogenization of I_i , and

$$\tilde{J} = J_0 \cap J_1 \cap \dots \cap J_n.$$

Show that the following are equivalent:

- J does not have $\langle x_0, x_1, \dots, x_n \rangle$ as an associated prime;
- $\tilde{J} = J$.