MATH 497 INTRODUCTION TO APPLIED ALGEBRAIC GEOMETRY
HOMEWORK 2

Assigned 8/28, due 9/4 in class.

Reading this week is page 24-48 in your book, Cox, Little, and O'Shea's *Ideals, Varieties, and Algorithms*. A pdf of the book is available for free from Penn State Libraries by going to `http://link.springer.com/book/10.1007/978-0-387-35651-8`. You should also go over the sage worksheet I will share with you.

Problem 1. *Find the equation in terms of* $x_{HH}, x_{HT}, x_{TH}, x_{TT}$ *that implicitizes the parametric representation* $x_{HH} = q_H d_H$, $x_{HT} = q_H d_T$, $x_{TH} = q_T d_H$, $x_{TT} = q_T d_T$. *Now assume all numbers are nonnegative real,* $q_H + q_T = d_H + d_T = 1$, *and so* $x_{HH} + x_{HT} + x_{TH} + x_{TT} = 1$. *Draw the image of the parametric representation in the tetrahedron representing the probability simplex for four outcomes.*

Problem 2. *Find the equation(s) in terms of* x, y, z *implicitizing the parametric representation* $x = \theta_1^2$, $y = \theta_1\theta_2$, $z = \theta_2^2$. *Explain why you think no more equations are needed.*

Now in Cox, Little, and O'Shea, in Chapter 1 Section 3, do exercises 4, and 11. In Chapter 1 Section 4, do exercises 3, 6, 7, 8.