

HOMework 6

MATH 435 Geometry
Fall 2007

10/23/2007. Due on 10/30/2007

Instructions: Solve the following problems. Provide as much written detail as possible.

1. Find the projective transformation in \mathbb{RP}^2 that takes the points $[1 : 0 : 1]$, $[-1 : 0 : 1]$, $[1 : 1 : 0]$, $[1 : -1 : 0]$ to the points $[1 : 0 : 3]$, $[3 : 1 : 0]$, $[1 : 2 : 3]$, $[3 : 2 : 1]$, in that order.

2. Let $t : \mathbb{RP}^2 \rightarrow \mathbb{RP}^2$ be the projective transformation defined by the matrix

$$A = \begin{bmatrix} 2 & 0 & 1 \\ -1 & 1 & 0 \\ 0 & 1 & 1 \end{bmatrix}.$$

Find its inverse transformation, by giving a matrix with integer coefficients representing it.

3. Find the images of the points $[1 : 2 : 3]$, $[0 : 1 : 0]$, $[1 : -1 : 1]$ and the line

$$x + 2y + 3z = 0$$

under the projective transformation t of exercise 2.

4. Read the statement and proof of Desargues' Theorem on page 130.