

Mathematics 3260H – Geometry II: Projective and Non-Euclidean Geometry
TRENT UNIVERSITY, Fall 2021

Assignment #4

There can be only one![†]

Due on Friday, 8 October.

*May be submitted on paper or via Blackboard.**

1. Draw the affine plane with four points on each line. [3]

NOTE. You can draw the picture in different ways, of course, but there is only one such plane up to isomorphism. You should have sixteen points and twenty lines. Make the picture pretty big, because you'll be adding to it, unless you want to keep drawing the same thing over and over again.

2. Add the line at infinity and all of its points, all properly connected, to your drawing for question 1 to make a drawing of a projective plane. [1]

NOTE. Since there is only one affine plane with four points on each line, there is only one projective plane with five points on each line.

3. As shown in class, introduce coordinates in this projective plane, using the symbols 0 , 1 , s , t , and ∞ . [2]

4. Work out the addition and multiplication tables for these coordinates. [4]

NOTE. No matter how you make the choices you have when introducing coordinates you should get basically the same tables in 4; the main possible difference is interchanging the the roles of s and t .

[†] With apologies to the *Highlander* franchise.

* All else failing, please email your solutions to the instructor at: sbilaniuk@trentu.ca