

Mathematics 3260H – Geometry II: Projective and non-Euclidean geometry
TRENT UNIVERSITY, Fall 2017

Assignment #2

The Poincaré half-plane

Due on Wednesday, 27 September.

This assignment is about some of the nuts and bolts of working in the Poincaré half-plane model of the hyperbolic plane.

1. Suppose (a, b) and (c, d) are the Cartesian coordinates of two points of the Poincaré half-plane model such that $a \neq c$. Find the centre and radius, in terms of a , b , c , and d , of the Euclidean semi-circle that is the hyperbolic line joining the given points in the Poincaré model. [5]
2. Consider the triangle of the Poincaré half-plane model with vertices at $(0, 1)$, $(2, 2)$, and $(3, 1)$ in Cartesian coordinates. Find the internal angles, the lengths of the sides, and the area of this triangle in the model. [5]