Mathematics 3260H – Geometry II: Projective and Non-Euclidean Geometry
TRENT UNIVERSITY, Fall 2019

Assignment #10
Cylindrical Geometry?
Due on Monday, 18 November.

Define a two-dimensional geometry as follows:

- The points of the geometry are the points on the cylinder $x^2 + y^2 = 1$ in $\mathbb{R}^3$.
- The lines of the geometry are the intersections of the cylinder with planes through the origin.
- A point is on a line in this geometry if this is so in $\mathbb{R}^3$.

Note that the cylinder is a surface in $\mathbb{R}^3$ which extends infinitely far parallel to the z-axis. Distances between points in this geometry are measured along the shortest part of any line joining the two points, and angles between lines are measured as angles between curves in $\mathbb{R}$ usually are.

1. Which of Euclid's five Postulates are satisfied in this geometry? (You may replace Euclid's statement of Postulate V with Playfair's Axiom.) *[10]*