

Mathematics 2260H – Geometry I: Euclidean geometry

TRENT UNIVERSITY, Fall 2018

Assignment #4

Parallels

Due on Friday, 5 October.

Recall that Euclid's Parallel Postulate is the cumbersome-seeming:

- V.** If a straight line falling across two other straight lines makes the sum of the internal angles on the same side less than the sum of two right angles, the two straight lines, if extended indefinitely, intersect on that side of the original straight line that the sum of the internal angles is less than the sum of two right angles.

Nowadays the favoured form of the Postulate, sometimes called Playfair's Postulate, is:

- V'.** Given an infinite straight line and a point not on that line, there is exactly one infinite straight line through that point that does not intersect the given straight line.
1. Show that Postulates V and V' are equivalent. You may assume Postulates I–IV, A, and S, along with Propositions I-1 through I-27 in Book I of the *Elements* (*i.e.* before Postulate V starts to be used). [7]
 2. Assuming Postulate V (along with the others :-), show that the sum of the interior angles of a triangle is a straight angle. [3]

“Parallel lines meet at infinity!”

Euclid repeatedly, heatedly, urged.

Until he died, and so reached that vicinity:

in it he found that the damned things diverged.

A grook by *Piet Hein*.