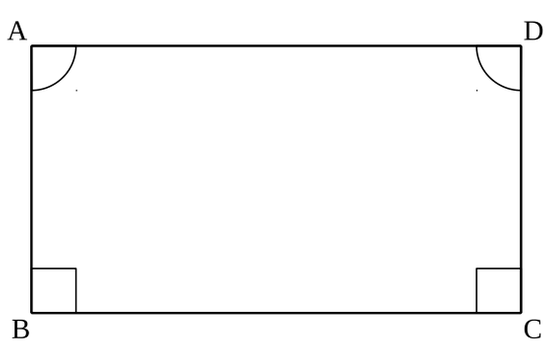
Mathematics 3260H – Geometry II: Projective and non-Euclidean geometry
TRENT UNIVERSITY, Fall 2017

Assignment #3
Saccheri Quadrilaterals
Due on Wednesday, 4 October.

Recall that a *Saccheri quadrilateral* is a quadrilateral $ABCD$ in which sides AB and CD are perpendicular to the base BC, with A and D on the same side of BC, and with $AB = CD$ (*i.e.* AB and CD have the same length).



One can use Postulates I–IV to show that $\angle BAD = \angle CDA$, but they don't quite suffice to show that these angles are right angles.

1. Suppose a Saccheri quadrilateral is drawn in the antipodal sphere model of the elliptic plane. Explain why AD must be shorter BC in this case. What is the shortest AD could be relative to BC? *[5]*

2. Suppose a Saccheri quadrilateral is drawn in the Poincare half-plane model of the hyperbolic plane. Explain why AD must be longer BC in this case. What is the longest AD could be relative to BC? *[5]*