

# Homework – Neutral Geometry

Deadline: Apr. 26, 2013

1. A quadrilateral  $\square ABCD$  is said to be a **Saccheri quadrilateral** if its two consecutive angles are right angles and two opposite sides adjacent only one of the two right angles are congruent, say,  $\angle A$  and  $\angle B$ , and  $AD \cong BC$ .

A quadrilateral  $\square ABCD$  is said to be a **Lambert quadrilateral** if it has at least three angles to be right angles.

Show that Saccheri quadrilaterals and Lambert quadrilaterals are convex.

2. A quadrilateral is said to be a **rectangle** if it is convex and its four angles are right angles.

Show that a quadrilateral is both a Saccheri quadrilateral and a Lambert quadrilateral if and only if it is a rectangle.

3. Let  $\square ABCD$  be a rectangle. Let  $AD$  be extended to a point  $E$  such that  $A * D * E$  and  $AD \cong DE$ , and  $BC$  be extended to a point  $F$  such that  $B * C * F$  and  $BC \cong CF$ . Show that  $\square ABEF$  is a rectangle.