Assignment #4 – Saccheri quadrilaterals
Due on Friday, 12 February.
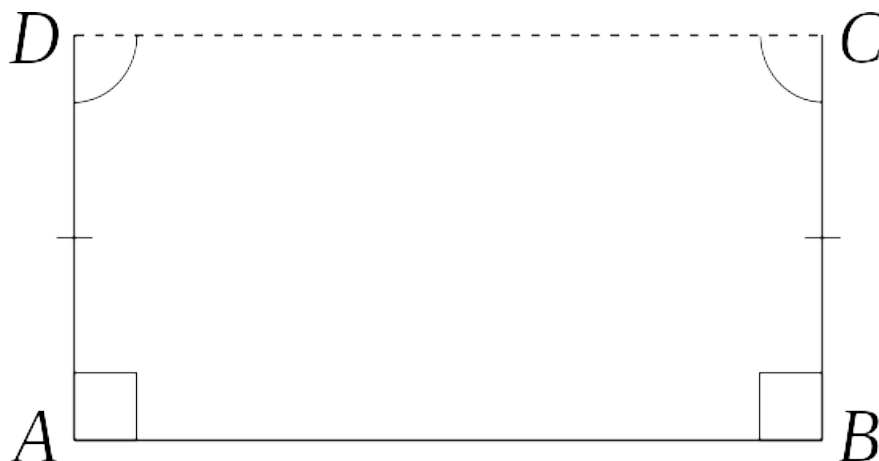
A *Saccheri quadrilateral* is a would-be rectangle, namely a quadrilateral that has two equal sides perpendicular to the base. In the diagram above the base is AB and we have $\angle DAB = \angle CBA = \dfrac{\pi}{2} \ rad$ and $|AD| = |BC|$.

1. Without using Postulate V or an equivalent, show that $\angle ADC = \angle BCD$. *[4]*

   That's as much as can be done without applying Postulate V or an equivalent.

2. Using Postulate V or an equivalent, show that $\angle ADC$ and $\angle BCD$ are right angles and that $|AB| = |CD|$, making $ABCD$ a rectangle. *[6]*

Note: Saccheri quadrilaterals are named after Giovanni Saccheri (1667-1733), a Jesuit priest and mathematician who attempted to show that Postulate V followed from the other Postulates by trying to show that denying Postulate V led to contradictions. Some of his ideas, and his use of these quadrilaterals in particular, were anticipated by the Persian poet and mathematician Omar Khayyam (1048-1131).