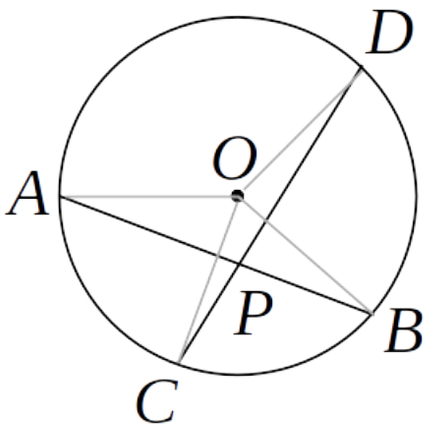
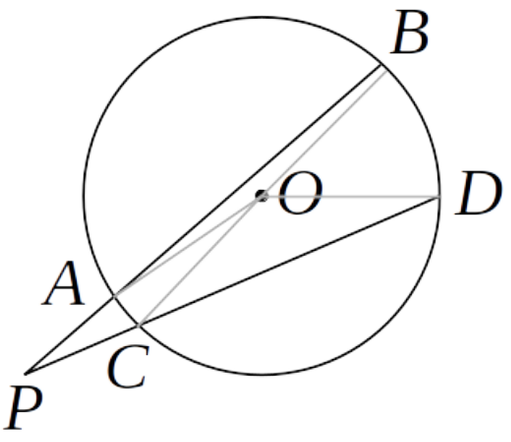
Mathematics 2260H – Geometry I: Euclidean Geometry

TRENT UNIVERSITY, Winter 2023

Assignment #7 – Chords and Cross-Ratios

Due on Friday, 10 March.





1. Suppose AB and CD are different chords of a circle with centre O. Show that if (the extensions of) AB and CD intersect at some point P inside the circle, then $|PA| \cdot |PB| = |PC| \cdot |PD|$. *[5]*

Hint: Show that $\triangle APD \sim \triangle CPB$. Now hark back to Assignment #2 and the various properties of similar triangles, which you may use without further ado.

2. Suppose AB and CD are different chords of a circle with centre O. Show that if (the extensions of) AB and CD intersect at some point P outside the circle, then $|PA| \cdot |PB| = |PC| \cdot |PD|$. *[5]*

Hint. Look up Proposition III-36, which is the special case where one of the chords is a single point T on the circle, so PT is tangent to the circle. You may use it without further ado, too, in order to prove the more general case above. You may also assume that you can draw a tangent line to a given circle from any point outside that circle.