

Mathematics 2260H – Geometry I: Euclidean geometry

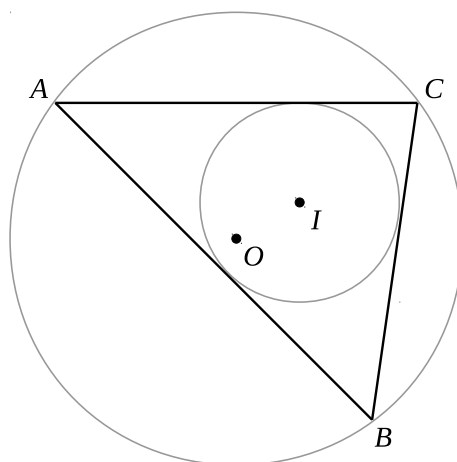
TRENT UNIVERSITY, Fall 2016

Assignment #4

Centres of triangles

Due on Wednesday, 2 November.

Suppose we are given $\triangle ABC$. The circle passing through all three vertices of the triangle is the *circumcircle* of the triangle and the circle inside the triangle that is tangent to all three sides of the triangle is the *incircle* of the triangle. The centres of these circles are the *circumcentre* and the *incentre* of the triangle, usually denoted by O and I , respectively.



1. Show that every triangle $\triangle ABC$ has a circumcircle and that the perpendicular bisectors of the sides meet at the circumcentre. [4]
2. Show that every triangle $\triangle ABC$ has an incircle and that the bisectors of the internal angles of the triangle meet at the incentre. [4]
3. Suppose that the circumcentre and the incentre are the same point for some triangle. What can you say about the triangle? Why? [2]