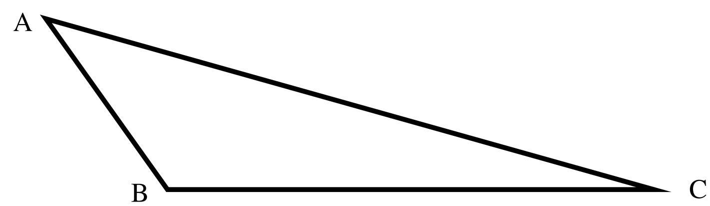
Math 329 (Geometry) Exam 1

March 5, 2014 | Professor Ilya Kofman

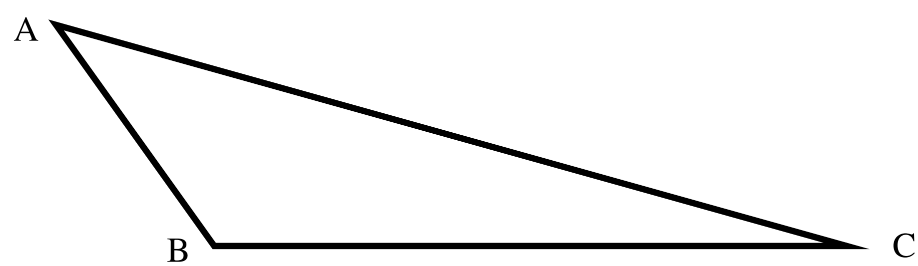
NAME: ____

Problem 1. Leave all construction marks. Clearly label your steps.

(a) Construct the circle circumscribed about $\triangle ABC$.

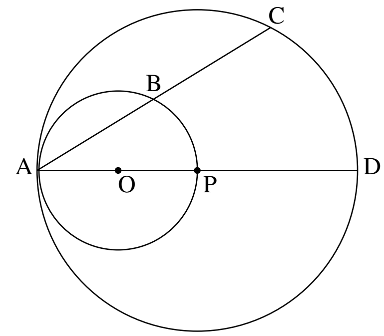


(b) Construct the circle inscribed in $\triangle ABC$.

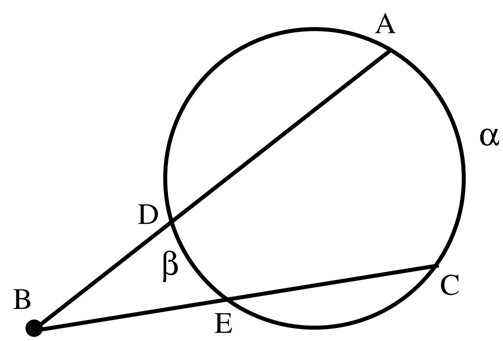


(c) Given AB below, construct a regular hexagon with <u>perimeter</u> $|AB|$.

A ____ B



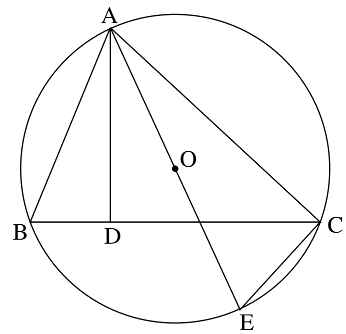
Problem 2.
In the figure, circles O and P are tangent at A.
Show that $AB = BC$. (Hint: Draw BP and CD.)



Problem 3.
Show that $m\angle ABC = \dfrac{1}{2}\,(\alpha - \beta)$.
Hint: Draw AE.

Theorem. If ΔABC has side lengths a, b, c, and r is the radius of its circumcircle, then $\text{Area}(\Delta ABC) = \dfrac{abc}{4r}$.

Problem 4. Complete the proof of this theorem by precisely justifying each step.



Let AD be an altitude of ΔABC. Let O be the circumcenter of ΔABC.

(a) $\angle ABC \cong \angle AEC$

(b) $\Delta ABD \sim \Delta AEC$

(c) $AB \cdot AC = AD \cdot AE$

(d) $\dfrac{AB \cdot AC \cdot BC}{4r} = \text{Area}(\Delta ABC)$.

Problem 5. On the back, prove the Pythagorean Theorem.