MATH 3440 Homework 3 Due date: September 12 (Wednesday)

Office Hours: M 3pm-4pm, W 11am-noon, 3pm-4pm, F 1pm-2pm and 3-4pm at UH2080B or make appointment
Course homepage:
`http://math.utoledo.edu/~mtsui/3440f12/3440.html`

(1) (20 pts) Use Ruler (Line through Two Points Tool, Segment between Two Points Tool, Ray through Two Points Tool) and Compass (Circle with Center through Point Tool) in GeoGebra to construct the following objects. (You are not allowed to use the Perpendicular Line Tool and Angle Bisector Tool.) Also explain your construction and justify your construction.
(a) Given a line l and a point P not on the line l. Construct the perpendicular to l through P.
(b) Given a segment $\overline{AB}$. Construct an equilateral triangle ΔABC.
(c) Given a angle. Create the angle bisector of the given angle.

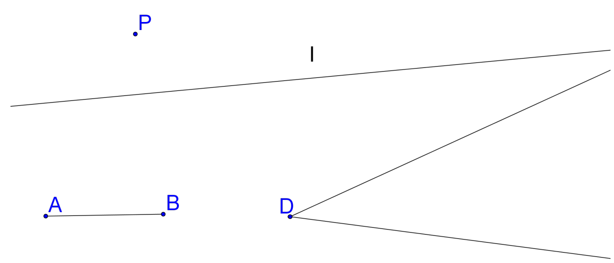

FIGURE 1.

(2) (30 pts) Prove the following statements.
(a) If two angles of a triangle are congruent, then the sides opposite these angles are congruent. (Hint: Use ASA.)
(b) An equiangular triangle is equilateral.
(c) All the angles of an equilateral triangle are congruent.

(3) (20 pts) Problem 6 in Problem Set 1.2 (on page 38).
Use GeoGebra to do part (a).

(4) (30 points) We will use this exercise to create the circumscribed circle and the inscribed circle of a triangle.
(a) (i) Construct a scalene and acute triangle ΔABC.

(ii) Construct the perpendicular bisector of $\overline{AB}$ and the perpendicular bisector of $\overline{AC}$
(iii) Find the intersection point of these two perpendicular bisectors constructed in previous step
(vi) Construct a circle whose center is the point constructed in (iii) and radius is the distance from the point constructed in (iii) to the vertex A.
You should see a circumscribed circle of the triangle ΔABC. Can you justify why we get a circumscribed circle?
(b) Repeat (a) for a scalene and obtuse triangle.
(c) (i) Construct a scalene and obtuse triangle ΔABC
(ii) Construct the angle bisector of $\angle A$ and the angle bisector of $\angle B$
(iii) Find the intersection point P of these two angle bisectors constructed in previous step
(vi) Use the point P constructed in previous step to construct a line through P and perpendicular to $\overline{AB}$
(v) Find the point of intersection of the line constructed in (vi) and $\overline{AB}$
(vi) Construct a circle whose center is the point constructed in (iii) and the radius is the distance between the point constructed in (iii) and the point constructed in (v).
You should see a inscribed circle of the triangle ΔABC. Can you justify why we get a inscribed circle?