Suggested Problems for Feb. 2,4 lectures.

1. In an arbitrary triangle $\triangle ABC$ let M, N, P be the midpoints of the side BC, CA and AB respectively.
(a) Show that the triangles $\triangle ABC$ and $\triangle MNP$ have the same centroid.

(b) Show that the circumcenter of $\triangle ABC$ is the orthocenter of $\triangle MNP$.

2. (The angle bisector Theorem) Prove: The internal bisector of an angle of a triangle divides the opposite side into two segments proportional to the sides of the triangle adjacent to the angle.

3. Formulate and prove an analogue theorem for *external* angle bisectors in a triangle. We call external angle bisector, the angle bisector of an exterior angle of the triangle.

4. (Excenters) Prove: The external angle bisectors of two angles of a triangle meet the internal angle bisector of the third angle at a point called an *excenter*.

5. Prove that the angle between the segments from the incenter to two vertices of a triangle has a radian measure equal to $\pi/2$ plus one-half the measure of the angle of the triangle at the third vertex.