# *MATH 341 — FALL 2011*
# *ASSIGNMENT 7*

Due October 14, 2011

*Geometry for College Students* by Martin Isaacs:

1. *[Isaacs, 2C.2]* Show that the circumcenter of $\Delta ABC$ is the orthocenter of its medial triangle.
2. *[Isaacs, 2E.2]* Suppose that the centroid and the incenter of $\Delta ABC$ are the same point. Show that $\Delta ABC$ is equilateral.
3. *[Isaacs, 2E.3]* Show that in a right triangle, the inradius, circumradius and semiperimeter are related by the formula $s = r + 2R$.
4. Show that for a right triangle $5m_c^2 = m_a^2 + m_b^2$.
5. Let $\Delta ABC$ be the triangle with vertices $(7, -1)$, $(8, 6)$, and $(-1, 3)$.[1]
   (a) Find the area of $\Delta ABC$.
   (b) Find the coordinates of the centroid of $\Delta ABC$.
   (c) Find the coordinates of the orthocenter of $\Delta ABC$.
   (d) Find the coordinates of the circumcenter of $\Delta ABC$.
   (e) Find the coordinates of the incenter of $\Delta ABC$.
   (f) Find the coordinates of the center of the Nine Point circle of $\Delta ABC$.
   (g) Find the length of the Euler segment of $\Delta ABC$.
   (h) Find the lengths of the medians of $\Delta ABC$.
   (i) Find the circumradius of $\Delta ABC$.
   (j) Find the inradius of $\Delta ABC$.
   (k) Find the radius of the Nine Point circle for $\Delta ABC$.

[1] You may use *GeoGebra* to help with this problem, but you do not have to do so.