HOMEWORK 1 - MATH 325

DUE DATE: Tuesday, January 21
INSTRUCTOR: George Voutsadakis

Read each problem very carefully before starting to solve it. Each question is worth 5 points. It is necessary to show your work.

GOOD LUCK!!

1. (a) In any triangle ABC, $(ABC) = \frac{abc}{4R}$.
   (b) Let p and q be the radii of two circles through A, touching BC at B and C, respectively. Then $pq = R^2$.
2. (a) If X, Y and Z are the midpoints of the sides, the three Cevians are concurrent.
   (b) Cevians perpendicular to the opposite sides are concurrent.
3. Find the ratio of the area of a given triangle to that of a triangle whose sides have the same lengths as the medians of the original triangle.
4. The square of the length of the angle bisector AL (Figure 1.3D, page 9) is $bc[1 - (\frac{a}{b+c})^2]$.
5. The Cevians AX, BY, CZ (Figure 1.4A, page 11) are concurrent (their common point is the *Gergonne point* of ABC).
6. Prove that $\frac{1}{r_a} + \frac{1}{r_b} + \frac{1}{r_c} = \frac{1}{r}$.