HOMEWORK 5 - MATH 325

DUE DATE: Tuesday, March 25
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. Let ABC be an equilateral triangle inscribed in a circle with center O, and let P be any point on the circle. Then the Simson line of P bisects the radius OP.

2. Let PT and PB be two tangents to a circle, AB the diameter through B, and TH the perpendicular from T to AB. Then AP bisects TH.

3. Let the incircle (with center I) of ABC touch the side BC at X, and let A' be the midpoint of this side. Then the line $A'I$ (extended) bisects AX.

4. For a triangle with angles $3\alpha, 3\beta, 3\gamma$ and circumradius R, Morley's triangle has sides $8R\sin\alpha\sin\beta\sin\gamma$.

5. The perimeter of the Varignon parallelogram equals the sum of the diagonals of the original quadrangle.

6. (a) For a parallelogram the sum of the squares of the sides equals the sum of the squares of the diagonals.

   (b) If an isosceles trapezoid has equal sides of length a, parallel sides of lengths b and c, and diagonals of length d, then $d^2 = a^2 + bc$.