Problems for the week Nov. 15 - Nov. 22

A–2 (1985) Let T be an acute triangle. Inscribe a rectangle R in T with one side along a side of T. Then inscribe a rectangle S in the triangle formed by the side of R opposite the side on the boundary of T, and the other two sides of T, with one side along the side of R. For any polygon X, let $A(X)$ denote the area of X. Find the maximum value, or show that no maximum exists, of $\frac{A(R)+A(S)}{A(T)}$, where T ranges over all triangles and R, S over all rectangles as above.

A–4 (1984)A convex pentagon $P = ABCDE$, with vertices labeled consecutively, is inscribed in a circle of radius 1. Find the maximum area of P subject to the condition that the chords AC and BD are perpendicular.

A–1 (1996) Find the least number A such that for any two squares of combined area 1, a rectangle of area A exists such that the two squares can be packed in the rectangle (without interior overlap). You may assume that the sides of the squares are parallel to the sides of the rectangle.

A–2 (1994) Find the positive value of m such that the area in the first quadrant enclosed by the ellipse $\frac{x^2}{9} + y^2 = 1$, the x-axis, and the line $y = 2x/3$ is equal to the area in the first quadrant enclosed by the ellipse $\frac{x^2}{9} + y^2 = 1$, the y-axis, and the line $y = mx$.