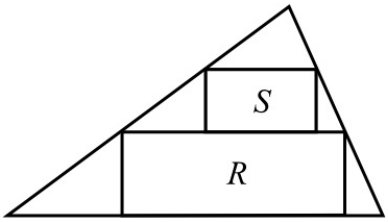
PUTNAM EXAM SEMINAR
FALL 2013

ASSIGNMENT 4
DUE SEPTEMBER 30

Exercise 1. Let T be an acute triangle. Inscribe a pair R, S of rectangles in T as shown below.



Let $A(X)$ denote the area of polygon X. Find the maximum value, or show that no maximum exists, of $\dfrac{A(R)+A(S)}{A(T)}$, where T ranges over all acute triangles and R, S over all rectangles as above. [Putnam 1985, A2]

Exercise 2. An ellipse, whose semi-axes have lengths a and b, rolls without slipping on the curve $y = c\sin(x/a)$. How are a, b, c related, given that the ellipse completes one revolution when it traverses one period of the curve? [Putnam 1995, B2]