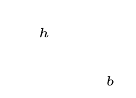
The William Lowell Putnam Mathematical Competition

takes place Saturday, December 7, 2002.
Last year, Stanford, placed fifth.

Sign-up and Introductory Meeting
Thurs. Oct. 10, 3:15–3:45 pm, in 380–383N

We will also discuss times and dates of problem-solving preparatory sessions. If you can't make it and are even potentially interested, please e-mail vakil@math.stanford.edu.
For more information: http://math.stanford.edu/∼vakil/stanfordputnam

Sample problems:
1. Let S be a set of real numbers which is closed under multiplication (that is, if a and b are in S, then so is ab). Let T and U be disjoint subsets of S whose union is S. Given that the product of any *three* (not necessarily distinct) elements of T is in T and that the product of any three elements of U is in U, show that at least one of the two subsets T, U is closed under multiplication.
2. Inscribe a rectangle of base b and height h and an isosceles triangle of base b in a circle of radius one as shown. For what value of h do the rectangle and triangle have the same area?



3. Evaluate
$$\int_2^4 \frac{\sqrt{\ln(9-x)}\,dx}{\sqrt{\ln(9-x)}+\sqrt{\ln(x+3)}}.$$
4. Find all real-valued continuously differentiable functions f on the real line such that for all x
$$(f(x))^2 = \int_0^x \left((f(t))^2 + (f'(t))^2\right)\,dt + 1990.$$
5. Prove that, for any integers a, b, c, there exists a positive integer n such that $\sqrt{n^3+an^2+bn+c}$ is not an integer.