

Explanation of SPOJ Problem MAXLN

First of all the triangle CAB shown in the figure is right angled triangle. So, now we have :

$$AB^2 + AC^2 = BC^2 \quad (1)$$

$$AB^2 + AC^2 = (2r)^2 \quad (2)$$

$$AB^2 = 4r^2 - AC^2 \quad (3)$$

As given in the question :

$$s = AB^2 + AC \quad (4)$$

$$s = 4r^2 - AC^2 + AC \quad (5)$$

$$s = -AC^2 + AC + 4r^2 \quad (6)$$

Now we have a quadratic equation, and we have to find its maximum. Maximum value occurs when

$$AC = \frac{-b}{2a} \quad (7)$$

So now using values of a and b from equation 6 we get :

$$\begin{aligned} AC &= \frac{-b}{2a} \\ &= \frac{-1}{-2} \\ &= \frac{1}{2} \end{aligned} \quad (8)$$

Putting the value of AC from 8 in 6 we get :

$$\begin{aligned} s &= -\frac{1^2}{2} + \frac{1}{2} + 4r^2 \\ &= -\frac{1}{4} + \frac{1}{2} + 4r^2 \\ &= \frac{1}{4} + 4r^2 \\ &= 0.25 + 4r^2 \end{aligned} \quad (9)$$

(10)

Hence the equation we are going to use is :

$$s = 0.25 + 4r^2 \quad (11)$$