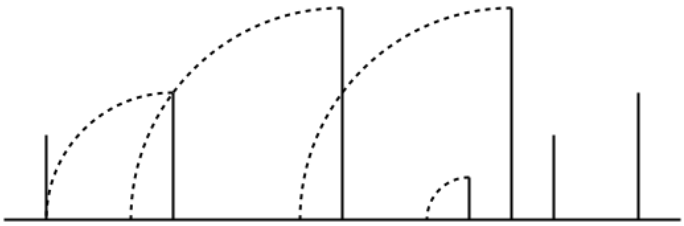
Problem D : Dominoes



Pixar is gearing up to introduce its next animated film, Elemental, at the 2023 Cannes Film Festival. But one of the scenes needs re-rendering. In this scene, there are n dominoes in a straight line, and one of them is supposed to fall and drop a number of subsequent dominoes in a domino-like manner. Considering it is less than 1 month away from the 2023 Cannes Film Festival, Pixar asked you to write a program that calculates the cost of re-rendering the scene for n initial domino choices.

To simplify the calculations, we assume that the dominoes are displayed from the side like line segments with no width on the coordinate axis, and they fall to the left. They are numbered from left to right and domino i has height l_i and is located at x_i. The cost of re-rendering this scene is equal to the area of the moving part of the scene, i.e. the union area of quarter circles of dropped dominoes. Note that domino falling areas may overlap, and the overlapped area should be calculated only once. The picture illustrates the falling of dominoes in the first sample test, when the initial domino choice for falling is the domino number 5.

Input

The first line of input contains a positive integer n, indicating the number of dominoes. The next n lines, each consists of a pair of integers, x_i and l_i, indicating the location and the height of the domino number i. It is guaranteed that $n \leqslant 200,000$ and $1 \leqslant x_i, l_i \leqslant 10^9$. Dominoes are given from left to right; i.e. $x_i < x_{i+1}$.

Output

Output n lines, where the i-th contains the cost of re-rendering the scene with i-th domino as the initial falling domino. All numbers must have an absolute or relative error of at most 10^{-6}.

Example

Standard Input	Standard Output
7 2 2 5 3 9 5 12 1 13 5 14 2 16 3	3.141592654 7.068583471 24.659773696 0.785398163 42.250963921 44.164186876 49.714124052