Fall 2020
Problem Solving through Computational Thinking ECE30017

Week 7

- C5. Balloon
  Deadline: 11:59 PM, 16 October (Fri)

C5. Balloons

To decorate a celebration party, we put n balloons along a horizontal line. The i-th balloon is attached to point x_i on the line. Every balloon is a sphere. The radius of a balloon grows continuously as air comes in. Initially, every balloon has no air, and thus, its radius is zero. You may assume that x_i is less than x_{i+1} for $1 \leq i < n$.

We blow up the balloons, one by one, from the one at x_1 along the line. The i-th balloon increases in size until one of the following conditions is satisfied:

- The i-th balloon touches one of the existing balloons.
- The radius of i-th balloon reaches a given radius bound r_i.

Write a program that finds the radii of balloons, given their positions and radius bounds.

(continued)

Requirements

Input data

- The first line from the standard input has an integer n, which represents that the number of balloons for $1 \leq n \leq 100{,}000$.
- Each of the remaining n lines has the location of a balloon and its radius bound. For example, the $(i+1)$-th line contains two integers x_i and r_i where $0 \leq x_i \leq 10^9$ and $1 \leq r_i \leq 10^9$ for all i.

Output data

- Print out n real numbers to the standard output such that the i-th number represents the radius of the i-th balloon.
- Your program must return the answer within 1.0 second.
- Your answer for a radius will be regarded as correct if it is within 0.001 from the true value.

(continued)

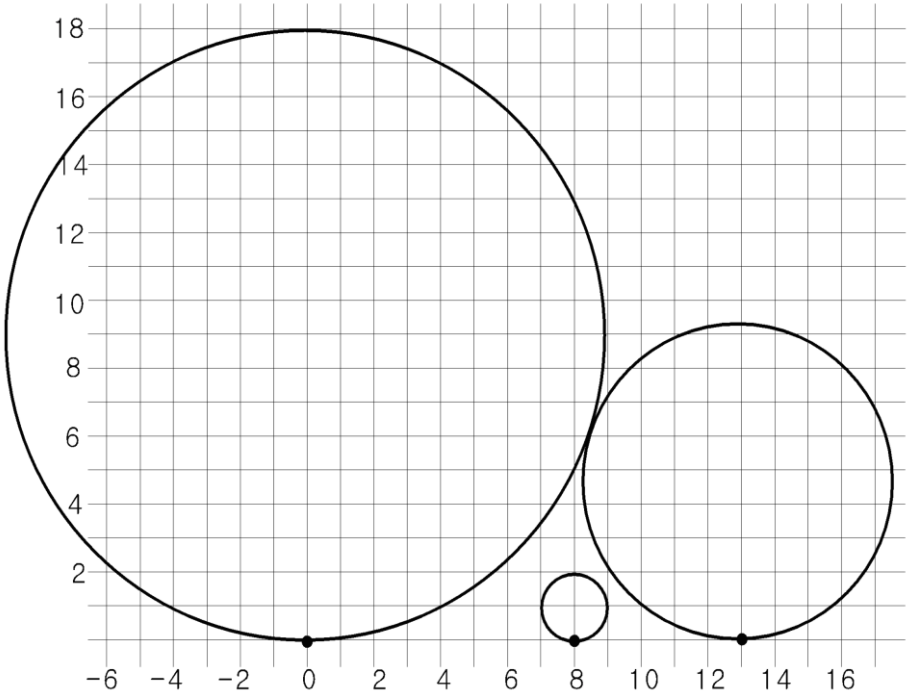
Example of test data

Input data

```
3
0 9
8 1
13 7
```

Output data

```
9.000
1.000
4.694
```



Teams for C5

501	강하영	김승우	
502	정원식	박민준	
503	박수현	송진범	
504	임예찬	정진혁	
505	전해주	한찬솔	
506	지성민	정희석	
507	김유진	정예은	
508	이예준	신희주	
509	최재혁	황소정	
510	정현섭	윤다은	
511	김석진	송수근	
512	홍석현	홍원표	
513	김기훈	김지원	
514	김윤정	김준서	
515	윤지원	한정섭	최우석