Problem C. Cable Way

Source file name:	`C.c, C.cpp, C.java`
Input:	`Standard`
Output:	`Standard`
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Over the mountains there is a system of basements for a secret research facility. There are many researchers that like to do all their work because it is a quiet place and also the weather is very nice since the mountains create a shadow that covers the sunlight.

A big problem is that there are no roads and helicopters can not get into the mountains, this is why they are planning to build a net of cableways to travel faster between the facility.

The terrain on the facility consists of a series of mountains that vary on height and distance. All the facilities are aligned on a line and there are also one on the edges, those two are the tallest always. Each facility is connected to at least another two facilities. The plan is to connect each one to the next facility that is taller to the left and the next taller to the right. Also, since the two at the edges are the tallest, those don't have a facility which needs to be connected directly (just have connections from lower facilities).

Given the list of facilities, the distance in meters to the leftmost and height of each facility, can you calculate the number of facilities to which each facility is connected and the distance that each cable will have?

Input

The input begins with a line with a single number N that tells how many facilities are there excluding the two at the edges. Each of the next $N + 2$ lines contains two numbers x_i and h_i, where x_i is the distance to the lsftmost facility and h_i is the height of the facility. The first facility is always located at $x = 0$ and the first and last are the same height and also the tallest. There are no two facilities at the same distance and facilities are given in increasing order of x_i in the input.

- $1 \leq N \leq 5 * 10^5$
- $1 \leq B \leq 10^8$

Output

For each test case you must print N lines with 4 numbers each, l_i, r_i, d_l, d_r, where l_i and r_i are the indexes of the facilities to which the facility i is connected to the left and to the right respectively (the first facility has index 0). d_l and d_r are the lengths of the cables that connect the facilites rounded to 4 decimas.

Example

Input	Output
4 0 10 2 8 4 2 6 2 8 8	0 5 2.8284 8.2462 1 4 6.3246 7.2111 1 4 7.2111 6.3246 0 5 8.2462 2.8284