

C. New Year and Curling

time limit per test: 2 seconds

memory limit per test: 256 megabytes

input: standard input

output: standard output

Carol is currently curling.

She has n disks each with radius r on the 2D plane.

Initially she has all these disks above the line $y = 10^{100}$.

She then will slide the disks towards the line $y = 0$ one by one in order from 1 to n .

When she slides the i -th disk, she will place its center at the point $(x_i, 10^{100})$. She will then push it so the disk's y coordinate continuously decreases, and x coordinate stays constant. The disk stops once it touches the line $y = 0$ or it touches any previous disk. Note that once a disk stops moving, it will not move again, even if hit by another disk.

Compute the y -coordinates of centers of all the disks after all disks have been pushed.

Input

The first line will contain two integers n and r ($1 \leq n, r \leq 1\,000$), the number of disks, and the radius of the disks, respectively.

The next line will contain n integers x_1, x_2, \dots, x_n ($1 \leq x_i \leq 1\,000$) — the x -coordinates of the disks.

Output

Print a single line with n numbers. The i -th number denotes the y -coordinate of the center of the i -th disk. The output will be accepted if it has absolute or relative error at most 10^{-6} .

Namely, let's assume that your answer for a particular value of a coordinate is a and the answer of the jury is b . The checker program will consider your answer correct if for all coordinates.

Example

input
6 2 5 5 6 8 3 12
output
2 6.0 9.87298334621 13.3370849613 12.5187346573 13.3370849613

Note

The final positions of the disks will look as follows:

In particular, note the position of the last disk.