# Lightning Conductor

Progressive climate change has forced the Byteburg authorities to build a huge lightning conductor that would protect all the buildings within the city. These buildings form a row along a single street, and are numbered from **1** to **n**.

The heights of the buildings and the lightning conductor are non-negative integers. Byteburg's limited funds allow construction of only a single lightning conductor. Moreover, as you would expect, the higher it will be, the more expensive.

The lightning conductor of height **p** located on the roof of the building **i** (of height **hi**) protects the building **j** (of height **hj**) if the following inequality holds:

hj <= hi + p - sqrt(abs(i-j))

where **|i-j|** denotes the absolute value of the difference between **i** and **j**.

Byteasar, the mayor of Byteburg, asks your help. Write a program that, for every building, determines the minimum height of a lightning conductor that would protect all the buildings if it were put on top of the building **i**.

## Input

In the first line of the standard input there is a single integer **n** (**1 <= n <= 500,000**) that denotes the number of buildings in Byteburg. Each of the following **n** lines holds a single integer **hi** (**1 <= hi <= 1,000,000,000**) that denotes the height of the **i**-th building.

## Output

Your program should print out exactly **n** lines to the standard output. The **i**-th line should give a non-negative integer **pi** denoting the minimum height of the lightning conductor on the **i**-th building.

## Example

For the input data:

```
6
5
3
2
4
2
4
```

the correct result is:

```
2
3
5
```

3
5
4