Prominence 1D

SEASON 10 – FOURTH ROUND

Maria is keen on mountain climbing. When her geography teacher understood that, she immediately invited her in the next expedition for measuring prominence of mountain peaks. The field data was gathered and Maria was assigned to analyze it.

Given is a sequence of N mountain sectors, numbered from 1 to N and each of them has a certain height H_i. A peak is such a sector, which is higher than both adjacent sectors (the adjacent sectors of the sector with number i are those with numbers $i-1$ and $i+1$, with the exception of the corner cases for the first and the last sector, which can be peaks if their only adjacent sectors have smaller height). The prominence of a peak is defined as the minimal height, which we need to descend from the peak in order to reach another sector with strictly bigger height. In other words, if we consider all the paths from the peak to a higher sector, its prominence is the minimal difference between its height and the height of the lowest sector along the path. By definition, the prominence of the highest top in the mountain is equal to its height.

Write a program, which finds the prominence of all peaks in the mountain.

Input

The first line of the input file `prominence1d.in` contains the number N. The second line contains N **different** numbers, separated by a space – the heights of the mountain sectors H_i.

Output

For each peak in the sequence of sectors (from left to right) on a separate line of the output file `prominence1d.out` print a single number equal to its prominence (relative height).

Constraints

$1 \leq N \leq 250\,000$

$1 \leq H_i \leq N$

Example

Input	Output
12 2 1 8 5 6 3 10 11 12 7 9 4	1 5 1 12 2

Explanation

The peaks have heights 2, 8, 6, 12 and 9. The prominence of the peak with height 2 is 1, because along the path to the peak with height 8 we need to descent a height of 1 unit. Likewise, for the peak with height 9, we need to descend 2 units (on the sector with height 7), in order to reach the peak with of height 12. For the peak of height 6 we consider the paths to 10 (with minimal sector height 3) and to 8 (with minimal sector height 5). We choose the latter and obtain that the prominence of the peak is 6-5=1. The prominence of the highest peak is 12.