FENWICK TREE

Fenwick tree is a data structure effectively supporting *prefix sum* queries.

For a number t denote as $h(t)$ maximal k such that t is divisible by 2^k. For example, $h(24) = 3$, $h(5) = 0$. Let $l(t) = 2^{h(t)}$, for example, $l(24) = 8$, $l(5) = 1$.

Consider array $a[1]$, $a[2]$, …, $a[n]$ of integer numbers. Fenwick tree for this array is the array $b[1]$, $b[2]$, …, $b[n]$ such that

$$b[i] = \sum_{j = i - l(i) + 1}^{i} a[j].$$

So

$b[1] = a[1]$,

$b[2] = a[1] + a[2]$,

$b[3] = a[3]$,

$b[4] = a[1] + a[2] + a[3] + a[4]$,

$b[5] = a[5]$,

$b[6] = a[5] + a[6]$,

...

For example, the Fenwick tree for the array

$$a = (3, -1, 4, 1, -5, 9)$$

is the array

$$b = (3, 2, 4, 7, -5, 4).$$

Let us call an array *self-fenwick* if it coincides with its Fenwick tree. For example, the array above is not self-fenwick, but the array $a = (0, -1, 1, 1, 0, 9)$ is self-fenwick.

You are given an array a. You are allowed to change values of some elements without changing their order to get a new array a' which must be self-fenwick. Find the way to do it by changing as few elements as possible.

Input

The first line of the input file contains n *($1 \le n \le 100000$.)* — the number of elements in the array. The second line contains n integer numbers — the elements of the array. The elements of the input array do not exceed 10^9 by their absolute values.

Output

Output n numbers — the elements of the array a'. If there are several solutions, output any one.

Examples

№	stdin	stdout
1	6 3 -1 4 1 -5 9	0 -1 1 1 0 9