Task «K-th zero»

Implement an efficient data structure that allows you to change the elements of an array and calculate the index of the k-th zero from the left in a given segment in the array.

Input format

The first line of the input contains an integer N ($1 \le N \le 200'000$) – the number of numbers in the array.

The second line contains N numbers from 0 to $100'000$ – array elements.

The third line contains an integer M ($1 \le M \le 200'000$) – the number of requests.

Each of the following M lines is a description of the request. First comes a single letter that encodes the type of request:

- «s» – calculate the index of the k-th zero;
- «u» – update the value of the element.

Three numbers follow the «s» – the left and right ends of the segment and the number k ($1 \le k \le N$).

The «u» is followed by two numbers – the element number and its new value.

Output format

For each «s» query, print the answer to that query. Print all numbers on one line separated by spaces. If there is no required number of zeros in the requested segment, print -1 for this query.

Sample input:

```
5
0 0 3 0 2
3
u 1 5
u 1 0
s 1 5 3
```

Sample output:

```
4
```