A. RMQ

Use segment tree to solve this problem.

In this problem you have an array $a_1, a_2, ..., a_n$ and m queries. Each query is one of the two types:

- Change a given element to a given value.
- Compute and print the minimum on a given segment.

Input

The first line contains a single integer n ($1 \leq n \leq 2 \cdot 10^5$).

The second line contains n integers $a_1, a_2, ..., a_n$ ($-10^9 \leq a_i \leq 10^9$) — the initial array.

The third line contains a single integer m ($1 \leq m \leq 2 \cdot 10^5$).

Each of the next m lines describes a query. Each line starts with an integer t ($t = 1$ or $t = 2$). If $t = 1$, it is followed by two integers id and x ($1 \leq id \leq n$, $-10^9 \leq x \leq 10^9$), that means you should assign x to a_{id}. If $t = 2$, it is followed by two integers l and r ($1 \leq l \leq r \leq n$), that means you should compute and print minimum among elements $a_l, a_{l+1}, ..., a_r$.

Output

For each query of the second type, print the answer.

Example

input

```
5
1 4 2 8 5
7
2 1 5
1 1 5
2 1 5
2 1 2
2 3 5
1 4 1
2 3 5
```

output

```
1
2
4
2
1
```

B. RSQ

Beware of large input. Use fast I/O methods.

```
Use segment tree to solve this problem.
```

You are given an array, you are to answer queries of sum on a segment and change a single element.

Input

The first line contains two integers n and m ($1 \le n, m \le 10^5$) — the size of the array and the number of queries.

The second line contains initial state of the array $a_1, a_2, ..., a_n$ ($-10^5 \le a_i \le 10^5$).

Then m lines follow, each describes a single query in format $t\ x\ y$ ($0 \le t \le 1$). If $t = 0$, you are to print the sum of elements on the segment $[x, y]$ ($1 \le x \le y \le n$). If $t = 1$, you are to set the x-th element to y ($1 \le x \le n$, $-10^5 \le y \le 10^5$).

Output

Print answers for each query in separate line.

Examples

input

```
5 3
1 2 3 4 5
0 1 5
1 1 -14
0 1 5
```

output

```
15
0
```

input

```
8 2
7 3 -10 4 1 2 5 -6
0 2 4
0 5 7
```

output

```
-3
8
```

C. Minimum And Collapse

You are given an permutation $a_1, a_2, ..., a_n$ of integers $1, 2, ..., n$. Now, you are to repeat the following operation n times: find the minimum element, print its index and remove it from array. After removal, you need to reenumerate the indices so they don't contain any gaps again (in other words, the elements to the right of the deleted mimimum are moved one position to the left).

Input

The first line contains a single integer n $(1 \le n \le 10^5)$.

The second line contains n integers $a_1, a_2, ..., a_n$ $(1 \le a_i \le n,$ all a_i are distinct).

Output

Print n integers — 1-indexed positions of minimums on each step.

Example

input

```
4
2 4 1 3
```

output

```
3 1 2 1
```

D. RMQ, RSQ And Addition On Segment

time limit per test: 4 seconds ❓
memory limit per test: 256 megabytes
input: standard input
output: standard output

You are given an array $a[0], a[1], ..., a[n - 1]$. Answer queries of three types:

- `+ l r d` — add d to each element $a[i]$ such that $l \leq i \leq r$,
- `m l r` — find minimum among $a[i]$ such that $l \leq i \leq r$,
- `s l r` — compute the sum of $a[i]$ such that $l \leq i \leq r$.

Input

The first line contains two integers n, m ($1 \leq n \leq 2 \cdot 10^5, 0 \leq m \leq 2 \cdot 10^5$) — the length of the array and the number of queries to answer.

The second line contains the initial array $a[0], a[1], ..., a[n - 1]$ ($-10^9 \leq a[i] \leq 10^9$), all the elements are integers.

The queries follow, one per line, as described in problem statement ($0 \leq l \leq r \leq n - 1, -5000 \leq d \leq 5000$). All parameters are integers.

Output

For each query of type m and s print the answer.

Example

input

```
5 8
6 2 -5 2 6
s 0 3
m 3 4
+ 1 2 7
s 0 3
m 3 4
+ 2 4 -4
m 0 4
s 1 4
```

output

```
5
2
19
2
-2
7
```

E. RMQ and Range Updates

Use segment tree to solve this problem.

You are given an array of n elements. Queries of two types follow. In the first type query, two integers are given — the left and right ends of a segment — and you need to find minimum on that segment. In the second type query, three integers are given: the left and right ends and an integer x, and you need to set all elements in the segment equal to this value x. Print the answer for each query of the first type.

Input

The first line contains an integer n ($1 \leq n \leq 10^5$).

The second line contains n integers $a_1, a_2, ..., a_n$ ($0 \leq a_i \leq 10^5$) — the elements of the array.

The third line contains a single integer m ($1 \leq m \leq 10^5$) — the number of queries.

The next m lines contain queries. Each query is represented with the query type integer (1 or 2), followed by segment ends l, r ($1 \leq l \leq r \leq n$) and an integer x ($0 \leq x \leq 100000$) in the case of second type query.

Output

For each query of the first type, print the answer in a separate line.

Examples

input

```
5
85891 24225 46881 86271 80072
4
1 1 1
2 2 4 35609
2 2 4 14000
1 2 4
```

output

```
85891
14000
```