G. Teams

Time Limit: 1 second

Points: 100

Fatima has arranged n people in a line, numbered from 1 to n, where the ith person initially has skill level s_i. These people are divided into teams, where each person is initially on their own team. The *strength* of a team is the minimum skill level of anyone in that team.

People's skill levels and teams change over time, and so you must support updates and answer queries. In particular, you must support m updates and queries, each with one of the following types:

1. Given two integers i and x, set the skill level of person i to x. This may (or may not) change the strength of person i's team.
2. Given two integers l and r, combine all people from l to r (inclusive) into one team. If any of these people were already part of another team, all members from that team are included in this new team.
3. Given two integers l and r, print the sum of strengths of all distinct teams represented by person l to person r (inclusive). If several members of the same team appear, then that team is only counted once.

Help Fatima support these updates and answer these queries.

Input

The first line of input consists of two integers n and m.

The second line of input consists of n space-separated integers $s_1, s_2, \ldots, s_n$, the ith of which represents the initial skill level of person i.

The next m lines describe the updates and queries. Each of these lines consists of three space-separated integers. The first of these integer is either 1, 2 or 3, describing the type of the update or query. The next two integers are either i and x, or l and r, depending on the type of the update or query.

Constraints

All input will satisfy the following constraints:

- $1 \leq n \leq 100,000$
- $1 \leq m \leq 200,000$
- $1 \leq s_i \leq 1,000,000,000$
- For all type 1 updates, $1 \leq i \leq n$ and $1 \leq x \leq 1\,000\,000\,000$
- For all type 2 updates and type 3 queries, $1 \leq l \leq r \leq n$

Output

For each type 3 query, output one line containing a single integer, the answer to that query.

Subtasks

G1 (30 points): There are no type 1 updates, and for all type 3 queries it holds that $l = 1$ and $r = n$.

G2 (30 points): For all type 3 queries it holds that $l = 1$ and $r = n$.

G3 (40 points): no restrictions.

Sample Input 1

```
4 5
4 3 2 3
3 1 4
2 2 4
3 1 4
2 1 2
3 1 4
```

Sample Output 1

```
12
6
2
```

Sample Input 2

```
5 6
2 4 1 3 8
3 2 4
2 2 3
3 2 4
2 3 5
1 3 10
3 1 2
```

Sample Output 2

```
8
4
5
```

Explanations

In sample input 1, the initial skill levels are $4, 3, 2, 3$ and the initial teams are $(1), (2), (3), (4)$.

The operations are as follows:

- There is a type 3 query with $l = 1$ and $r = 4$. The answer is $4+3+2+3 = 12$.
- There is a type 2 update with $l = 2$ and $r = 4$. The teams are now $(1), (2, 3, 4)$.
- There is a type 3 query with $l = 1$ and $r = 4$. Person 2, 3 and 4 are in the same team (which has a skill of 2) and person 1 is in their own team with a skill of 4. Hence the answer is $2 + 4 = 6$.
- There is a type 2 update with $l = 1$ and $r = 2$. Everyone is now in the same team.
- There is a type 3 query with $l = 1$ and $r = 4$. The answer is 2.

Note that this case satisfies the constaints of all 3 subtasks.

In sample input 2, the initial skill levels are $2, 4, 1, 3, 8$ and the initial teams are $(1), (2), (3), (4), (5)$.

The operations are as follows:

- There is a type 3 query with $l = 2$ and $r = 4$. The answer is $4 + 1 + 3 = 8$.
- There is a type 2 update with $l = 2$ and $r = 3$. The teams are now $(1), (2, 3), (4), (5)$.
- There is a type 3 query with $l = 2$ and $r = 4$. Person 2 and 3 are in the same team (which has a skill of 1) and person 4 is in their own team with a skill of 3. Hence the answer is $1 + 3 = 4$.
- There is a type 2 update with $l = 3$ and $r = 5$. The teams are now $(1), (2, 3, 4, 5)$.
- There is a type 1 update with $i = 3$ and $x = 10$. This sets person 3's skill level to 10.
- There is a type 3 query with $l = 1$ and $r = 2$. This query covers both teams, and so the answer is the sum of the skill levels of these teams, which is $2 + 3 = 5$.

Note that this case only satisfies the constraints of the final subtask.