Fast Search

Time limit: 1.0s **Memory limit:** 256M

Chunky Munky has an array of N numbers $a_1, a_2, \ldots, a_N$, along with Q queries.

Each query is one of the following 2 types:

- `1 p x`: Set $a_p = x$.
- `2 l r k`: Chunky Munky picks up a_l, then $a_{l+1}, a_{l+2}, \ldots$ all the way until a_r, and would like to know the index of the first element he picks up with a value strictly less than k. **It's guaranteed that the value of k will always be such that he will pick up a value strictly less than k during the process.**

Help Chunky Munky answer his queries!

Note that this problem will be **online enforced**, meaning that input will be given in an encrypted format. To encrypt the data, the values p, x, l, r, k in queries will be given as
$p \oplus \text{lastAns}, x \oplus \text{lastAns}, l \oplus \text{lastAns}, r \oplus \text{lastAns}, k \oplus \text{lastAns}$, where $\oplus$ denotes the bitwise XOR operation. Note that lastAns at any time is defined as the answer to the latest type 2 query. If no type 2 queries have occurred so far, $\text{lastAns} = 0$.

Constraints

For all subtasks:

$1 \leq N, Q \leq 10^6$

$1 \leq a_i, x, k \leq 10^9$

$1 \leq p \leq N$

$1 \leq l \leq r \leq N$

For 3 of 20 points, $1 \leq N, Q \leq 2\,000$.

For 10 of 20 points, $1 \leq N, Q \leq 100\,000$.

For all 20 points, no additional constraints apply.

Input Specification

The first line contains the integers N and Q.

The second line contains the array $a_1, a_2, \ldots, a_N$.

The next Q lines each contain a query of one of the above types.

Output Specification

For each query of type 2, output its answer on a separate line.

Sample Input

```
10 5
3 1 4 1 5 9 2 6 5 3
2 6 10 6
2 2 14 1
2 6 2 6
1 0 14
2 7 3 7
```

Sample Input (Unencrypted)

```
10 5
3 1 4 1 5 9 2 6 5 3
2 6 10 6
2 5 9 6
2 3 7 3
1 4 10
2 3 7 3
```

Sample Output

```
7
5
4
7
```