Problem C. Super Natural

Time limit 2000 ms
Memory limit 256MB

Problem Description

In mathematics, the natural numbers are the numbers 0, 1, 2, 3, etc., possibly excluding 0. Someone define the natural numbers as the non-negative integers 0, 1, 2, 3, ..., while others define them as the positive integers 1, 2, 3, ... In KCW lab, the super natural numbers are the positive numbers that have only 2 factors. For example, 3 is super natural number, and so is 19937.

KCW wants to do some research on super natural numbers. However, he is too busy, so he assigns the task to you. You will receive an array with n positive integers. Then, you need to do Q operations on this array. There are two kinds of operations:

1. change the number on index i to x. (i.e., $a[i] := x$)
2. Output the maximum of super natural numbers whose indices are in the range $[L, R]$. If there are no super natural numbers in the given range. Output -1.

For the example of operation 2, the largest super natural numbers of $[1, 4, 5, 2, 3]$ is 5; There are no super natural numbers in $[51, 550, 4]$. In this case, you should output -1.

Input format

The first line contains 2 integers $n, Q (1 \leq n, Q \leq 5 \times 10^5)$, the size of the array and the numbers of operations.

The second line contains n positive integers $a_1, \ldots, a_n (1 \leq a_i \leq 10^6)$.

Finally, there are Q lines describing the operations. Each line forms either "1 i x" or "2 L R".

- "1 i x": The operation 1, set the number on index i to x. $(1 \leq i \leq n; 1 \leq x \leq 10^6)$
- "2 L R": The operation 2, output the maximum of super natural numbers in $[a_L, a_{L+1}, \ldots, a_R]$. $(1 \leq L, R \leq n)$

Output format

For each operation 2, output 1 single integer which is the maximum of super natural numbers for the operations. If there are no super natural numbers in the given range. Output -1.

Subtask score

Subtask	Score	Additional Constraints
1	10	$n, Q \leq 1000; a_i, x \leq 100$
2	15	There are no operation 1.
3	25	$a_i, x \leq 100$
4	50	No constraints

Sample

Sample Input 1

```
10 5
12 12 16 4 8 1 19 19 8 14
2 6 7
2 7 9
1 5 7
2 3 5
2 2 5
```

Sample Output 1

```
19
19
7
7
```

Sample Input 2

```
10 5
10 1 6 3 18 13 6 9 5 4
2 4 7
2 2 5
2 1 8
2 4 5
2 2 2
```

Sample Output 2

```
13
3
13
3
-1
```