IOI Training Camp 2018 Practice Test 1

Nice SubSegments

Let's call arrays of the form $x, x+1, ..., x+k$ nice. In other words nice arrays are arrays that form increasing arithmetic progression with the difference of one.

You are given an array of N integers. Let's denote it's numbers by $a_1, a_2, ..., a_N$. You are also given M change queries. Every change query is a query of the form "X Y" with the meaning that the X-th number in it becomes equal to Y. We perform these queries one after another, strictly in this order. Please, calculate the length of the longest nice subarray of this array, i.e. the length of the longest segment $[L; R]$ such that $(a_L, a_{L+1}, ...a_R)$ is a nice array before all the queries and after every query.

Input

The first line of input consists of two integers N and M, separated by a single space - the length of the array and the number of queries.

The second line of input consists of N integers, the i-th equals to a_i - namely the i-th number in the array.

The following M lines contains the queries in the form "X Y", where X and Y are natural numbers with the meaning that the X-th number becomes equal to Y.

Output

Output the length of the longest nice subarray of the initial array at the first line of output.
Then, output M integers in separate lines. The i-th such line should contain the length of the longest nice subarray after the i-th changing query.
$a_i \leq 2 * N$ holds throughout.

Subtasks

Subtask 1 (20 Points):

- $1 \leq N \leq 100$
- $1 \leq M \leq 1000$

Subtask 2 (26 Points):

- $1 \leq N, M \leq 5000$

Subtask 3 (54 Points):

- $1 \leq N, M \leq 10^5$

Sample Input 1

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

Sample Output 1

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

Limits

Time: 2 seconds

Memory: 512 MB