Task: OCE
Grades

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XXIV OI, Stage III, Day one. Source file `oce.*` Available memory: 256 MB. *11.04.2017*

A physical education teacher has n pupils in their class. The school year is about to finish, so it is high time he gave the pupils their final grades. To this end, the teacher assigned each pupil an *athletic index* a_i in the range from 1 to n, which reflects their sports abilities. In the very beginning of each class, the pupils form a line. The teacher assigns grades in order, from left to right. Each grade can be any integer in the range from 1 to n. (Yes, each pupil could possibly get a unique grade!)

However, the teacher desires that the grades satisfy the following conditions:

- For any pair of pupils v and u, if v's athletic index is greater than u's, then v's grade cannot be less (worse) than that of u, as this would be clearly unjust.
- For any pair of pupils v and u, if v follows u in the line, thus being graded later, then v's grade be less (worse) than that of u, as this would make v very sad.
- The teacher wants to maximize the number of different grades they give while observing above rules.

Each time the class takes place, the pupils form an ordered line, and the teacher is used to a particular order. Asked by the pupils though, the teacher agreed that between successive classes, two pupils may swap positions in the line. The teacher has not decided yet when to give final grades. Help the teacher by writing a program that will determine, for each class till the end of semester, how many different grades the teacher could give in that class, should they decide to give final grades to all pupils then.

Input

In the first line of the standard input, there are two positive integers n and z specifying the number of pupils and of classes yet to be held.

In the second line, there is a sequence of n integers $a_1, a_2, \ldots, a_n$ $(1 \leq a_i \leq n)$ specifying the athletic indices of successive pupils, in the teacher's preferred order, assumed at the very first of remaining classes. The indices are pairwise different, thus forming a permutation of $1, 2, \ldots, n$. Therefore, we may identify a pupil with their athletic index.

In the $z-1$ lines that follow, the swaps are described. Namely, in the i-th such line, there are two integers p_i and q_i $(1 \leq p_i < q_i \leq n)$, which signify that the pupils who were at positions p_i and q_i in the line during the i-th class are going to swap places before the next class.

Output

Exactly z lines should be printed to the standard output. The number in the i-th line should correspond to the maximum number of different grades that the teacher could give during the i-th class.

Example

For the input data:	the correct result is:

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

Explanation for the example: In the first class, the pupils' order is $1, 2, 3$, so each of them can get a different grade. In the second class, the order is $3, 2, 1$, and in third one it is $2, 3, 1$. In either order, the pupil 1 cannot receive a better grade than anyone else's as their athletic index is the smallest. At the same time, this pupil cannot receive a grade worse than anyone else's, because they are graded last. Finally, at the last class, the pupils' order is $2, 1, 3$. Then the pupil 3 can receive a better grade than pupils 1 and 2, who have to get a common grade.

Sample grading tests:

`1ocen:` small correctness test – in the first class, every pupil at an odd position has greater athletic index than every pupil at an even position, and in the final class the pupils are ordered increasingly by their athletic indices.

`2ocen:` $n = 2000$, $z = n/2 + 1$, $a_i = i + 1$ for odd i, $a_i = i - 1$ for even i, $p_i = 2i - 1$, $q_i = 2i$ (successive odd-even pairs of pupils are swapping); the maximum number of possible different grades increments from $n/2$ to n;

`3ocen:` $n = z = 300\,000$, $a_i = i$ (the pupils are ordered increasingly by their athletic indices), $p_i = i$, $q_i = i - 1$ (pupil n swaps with everyone in turn); the number of grades decrements from n to 1.

Grading

The set of tests consists of the following subsets. Within each subset, there may be several test groups.

Subset	Property	Score
1	$n, z \leq 2000$	24
2	$n \leq 2000$, $z \leq 300\,000$	8
3	$n, z \leq 100\,000$	30
4	$n \leq 1\,000\,000$, $z \leq 300\,000$, teacher may never give more than 15 different grades	10
5	$n \leq 1\,000\,000$, $z \leq 300\,000$, pupils only swap with their predecessor or successor in the ordered line	20
6	$n \leq 1\,000\,000$, $z \leq 300\,000$	8