

C Sort

You are given an array x_1, x_2, \dots, x_n of n integers. Your task is to answer q queries (a, b) . In one operation, you are allowed to do one of the following:

- sort the first a numbers in nondecreasing order, or
- sort the last b numbers in nondecreasing order.

What is the minimum number of operations needed to sort the whole array in nondecreasing order? In each query, the array starts from the initial values x_1, x_2, \dots, x_n .

Input

The first line contains two integers n and q : the length of the array and the number of queries.

The second line contains n integers x_1, x_2, \dots, x_n : the contents of the array.

The next q lines describe the queries. Each line contains two integers a and b .

Output

Print q lines with the answers to each query. If it is impossible to sort the array, print "-1".

Constraints

- $1 \leq n, q \leq 2 \cdot 10^5$
- $1 \leq x_i \leq 10^9$
- $1 \leq a, b \leq n$ in all queries

Example

Input:

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

Output:

```
1
-1
2
```

Explanation: In the first query, the array can be sorted in one operation by sorting the first 4 numbers.

The array cannot be sorted with the available operations in the second query.

In the third query, the array can be sorted in two operations: start by sorting the first 2 numbers and then sort the last 5 numbers.

Scoring

Subtask	Constraints	Points
1	$n, q \leq 10$ and $a + b \leq n$ in all queries	6
2	$n, q \leq 10$	5
3	$a + b \leq n$ in all queries	7
4	$1 \leq x_i \leq 2$	14
5	$n, q \leq 5000$ and the array is a permutation of the numbers $1, 2, \dots, n$	23
6	$n, q \leq 5000$	12
7	No additional constraints	33