

Problem D. エロ発生 (Error)

- 2023.10.06 15:00 Update: Strengthened testcases and rejudged solutions.
- 2023.10.06 15:00 Update: Added Sample 3.

Problem Description

After three years of effort, Neko-chan successfully nurtured the rarest shiny *Noitatumrep* in the game! Regular Noitatumreps usually resemble $[n, n-1, \dots, 1]$, but shiny Noitatumreps, on the other hand, have the exact opposite appearance, represented as $[1, 2, \dots, n]!$

Just after Neko-chan went to bed, a sudden earthquake struck, causing a major server error in the game, resulting in the loss of a significant amount of data, known as "エロ発生." After the server maintenance was completed, Neko-chan discovered that her Noitatumrep was no longer the rare shiny.

She wanted to file a complaint with the game company, and their response was, "We will compensate you if you can prove that there is a possibility that the earthquake indeed caused the disappearance of the shiny." Neko-chan collected earthquake-related information and framed the problem in the following way:

1. Initially, Neko-chan had a shiny Noitatumrep $a = [1, 2, 3, \dots, n-1, n]$, which turned into b ($b \neq a$) after server maintenance.
2. After that, there were q instances of "エロ発生," which caused genetic mutations in the Noitatumrep between positions $[\ell_i, r_i]$, potentially resulting in any reordering of the subarray $[a_{\ell_i}, a_{\ell_i+1}, \dots, a_{r_i}]$.
3. Neko-chan wants to know the earliest instance of "エロ発生" after which her shiny Noitatumrep could have become b .
4. If, even after q instances of "エロ発生," it is still not possible to become b , the game company may have randomly generated a Noitatumrep for Neko-chan. In this case, please output -1 .

Input Format

- line 1: $n \ q$
- line 2: $b_1 \ b_2 \ \dots \ b_n$
- line $2+i$ ($1 \leq i \leq q$): $\ell_i \ r_i$

Output Format

- line 1: the minimum k such that after the first k events a might become b (or -1 if impossible).

Constraints

- $2 \leq n \leq 100\,000$.
- $1 \leq q \leq 1000$.
- $\{b_1, b_2, \dots, b_n\}$ is a permutation of $\{1, 2, \dots, n\}$.
- $b \neq [1, 2, \dots, n]$.
- $1 \leq \ell_i < r_i \leq n$ for $i = 1, 2, \dots, q$.
- All input values are integers.

Subtasks

1. (70 points) $n \leq 1000$.
2. (30 points) No additional constraints.

| No. | Testdata Range | Time Limit (ms) | Memory Limit (KiB) |
|---------|----------------|-----------------|--------------------|
| Samples | 1 - 3 | 750 | 262144 |
| 1 | 1 - 23 | 750 | 262144 |
| 2 | 1 - 36 | 750 | 262144 |

Samples

Sample Input 1

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

This sample input satisfies the constraints of all the subtasks.

Sample Output 1

```
2
```

The shiny Noitatumrep a is initially $[1, 2, 3, 4, 5]$. After the first "エロ発生," $[a_1, a_2, a_3, a_4]$ gets shuffled. One of the possible results is $[3, 4, 2, 1, 5]$. If the second event happens, coincidentally, in such a way that the 4th and the 5th elements are swapped, the Noitatumrep will appear just like $b = [3, 4, 2, 5, 1]$.

Since a_5 will not be shuffled during the first event, it cannot result in b after just one "エロ発生." Thus the answer is 2.

Sample Input 2

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

This sample input satisfies the constraints of all the subtasks.

Sample Output 2

```
-1
```

We can observe that a_5 cannot be changed during the first event. From the second event onward, the shuffled positions do not contain 1, so 5 cannot be moved into position 1.

Sample Input 3

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

This sample input satisfies the constraints of all the subtasks.

Sample Output 3

```
-1
```