

Team Parade

At the opening ceremony of JBOI, there are N contestants standing in one long line, at positions $1, 2, \dots, N$. Each contestant belongs to exactly one of K teams, numbered from 1 to K , and for every team from 1 to K there is at least one contestant that belongs to that team.

The organisers want to form a ceremonial parade by choosing exactly one contestant from each team. The chosen contestants must appear in the line in the order of their team numbers. In other words, the organisers must choose a contestant from team 1, then somewhere to the right of the first chosen contestant a contestant from team 2, then somewhere to the right of the previously chosen contestant a contestant from team 3, and so on, until team K .

For two consecutively chosen contestants i and $i + 1$, on positions p_i and p_{i+1} respectively, define their distance as $p_{i+1} - p_i$.

Let D be the maximum distance between every two consecutively chosen contestants at the parade. Choose the contestants such that the value of D is as small as possible, then output it.

If it is impossible to choose one contestant from each team in the required order, output -1 .

Input

The first line contains two integers N and K .

The second line contains N integers $a_1, a_2, \dots, a_N$, where a_i is the team number of the i -th contestant in the line.

Output

Output one integer: the smallest possible value of D , or -1 if it is impossible to form the parade.

Constraints

- $2 \leq K \leq N \leq 2 \cdot 10^5$
- $1 \leq a_i \leq K$
- it is guaranteed that every team appears at least once

Subtasks

Subtask 1 (4 points)

$$N = K$$

Subtask 2 (6 points)

$$K = 2$$

Subtask 3 (11 points)

$$K = 3$$

Subtask 4 (15 points)

The array a is sorted in nondecreasing order.

Subtask 5 (28 points)

$$N \leq 2000$$

Subtask 6 (17 points)

Each team has at most 50 contestants.

Subtask 7 (19 points)

No additional constraints.

Examples

Input 1

```
12 4
2 1 3 1 2 2 3 4 2 3 4 4
```

Output 1

```
2
```

Explanation 1

One possible choice is to take contestants at positions 4, 6, 7, 8. Their teams are 1, 2, 3, 4, and the distances between consecutive chosen contestants are 2, 1, 1. Therefore, $D = 2$.

It is not possible to achieve distance $D = 1$, so the answer is 2.

Input 2

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

Output 2

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-1
```

Explanation 2

The only contestant of team 2 stands at position 2, to the left of the only contestant of team 1 at position 3, so no valid parade exists.