D – Deque Sort

Memory limit: 1024 MB
Time limit: 4 s

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There are n parcels, numbered from 1 to n, that just arrived to a warehouse. They came in the order $a_1, \ldots, a_n$, and we want to sort them so that they are in the order $1, 2, \ldots, n$.

The sorting machine in the warehouse works in phases. Each phase accepts a row $a_1, \ldots, a_n$ of parcels and proceeds as follows: First, the first parcel a_1 is put into a new row. Then, for every parcel a_i for $i = 2, \ldots, n$, if a_i is greater than the last (rightmost) parcel in the new row, it puts it at the end of the row. Otherwise, it puts it at the front of the row.

If the new row is not sorted, it serves as the input for the next phase of the sorting machine.

Write a program that helps testing whether the machine works as intended by answering queries of the form "which parcel is at the b-th place after t phases".

Input

The first line of the input contains two integers n and q ($1 \leq n, q \leq 5 \cdot 10^5$), denoting the number of parcels and the number of queries, respectively.

The second line contains a sequence of n integers $a_1, a_2, \ldots, a_n$ ($1 \leq a_i \leq n$, $a_i \neq a_j$) that represent the initial ordering of the parcels.

The next q lines contain queries; the i-th line contains two integers t_i and b_i ($0 \leq t_i \leq 10^9$, $1 \leq b_i \leq n$), denoting the i-th query.

Output

Output exactly q lines. The i-th line should contain the answer to the i-th query.

If the machine performed less than t_i phases, write -1. Otherwise, write which parcel is at the position b_i from left, after t_i phases have been performed.

Example

For the input data:

```
5 4
2 1 3 5 4
1 1
3 2
4 1
0 4
```

the correct result is:

```
4
2
-1
5
```

Explanation: The machine will perform three phases:

$$2\,1\,3\,5\,4 \quad \to \quad 4\,1\,2\,3\,5 \quad \to \quad 3\,2\,1\,4\,5 \quad \to \quad 1\,2\,3\,4\,5.$$

Whereas for the input data:

```
1 1
1
1 1
```

the correct result is:

```
-1
```