A. Rivalry

Time Limit: 1 second

Points: 100

In generations past, the nations of Xoblana and Yubreujan were constantly at war. To avoid future bloodshed, two wise diplomats agreed to carry on the rivalry in tug-of-war instead. Nowadays, each year the two nations send their finest athletes to compete in a match, and the winning team is recorded as `X` or `Y`.

The first tug-of-war match took place in year 1, and n matches have been completed. The $(n+1)$th match is upcoming, and you are employed to provide statistics to aid the commentators. Specifically, you must answer questions of the form: in what year was team t's kth victory, counting since year s?

Input

The first line of input consists of two space-separated integers n and q, representing the number of previous matches and the number of questions respectively. The second line of input consists of a string $w = w_1 w_2 \dots w_n$, where each w_i represents the winning team in year i. q lines follow, the jth of which consists of a character t_j and two integers k_j and s_j, space-separated, representing the inputs to the jth question.

Constraints

All input will satisfy the following constraints:

- $1 \leq n, q \leq 100,000$.
- For all $1 \leq i \leq n$, w_i is either `X` or `Y`.
- For all $1 \leq j \leq q$, t_j is either `X` or `Y`, $1 \leq k_j \leq n$ and $1 \leq s_j \leq n$.

Output

Output q lines, the jth of which is the year which answers the jth question, or 0 if no such year exists.

Subtasks

A1 (50 points): $1 \leq n, q \leq 5,000$.

A2 (50 points): no restrictions.

Sample Input 1

```
5 6
XYXXY
```

```
X 2 1
X 2 2
X 2 3
X 2 4
Y 1 2
Y 1 3
```

Sample Output 1

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

Sample Input 2

```
3 3
YYY
X 1 1
Y 2 2
Y 3 2
```

Sample Output 2

```
0
3
0
```

Explanation

In sample case 1, the questions ask for:

1. Xoblana's second victory starting from year 1, which occurred in year 3.
2. Xoblana's second victory starting from year 2, which occurred in year 4.
3. Xoblana's second victory starting from year 3, which occurred in year 4.
4. Xoblana's second victory starting from year 4, which has not yet occurred.
5. Yubreujan's first victory starting from year 2, which occurred in year 2.
6. Yubreujan's first victory starting from year 3, which occurred in year 5.

In sample case 2, the questions ask for:

1. Xobalana's first victory starting from year 1, which has not yet occurred.
2. Yubreujan's second victory starting from year 2, which occurred in year 3.
3. Yubreujan's third victory starting from year 2, which has not yet occurred.

B. Skyline

Time Limit: 1 second

Points: 100

The city of Aresburg is home to many impressive skyscrapers. The skyline consists of n buildings in a row, with the ith building of width 1 and height h_i. There are no gaps between buildings.

The city wants to commission a large work of art to add to the character of the city. The chosen design is square in shape, and must have one side along the ground. However, the residents insist that the artwork be placed in front of the existing buildings without adding to the skyline. A square artwork of size k can therefore be placed if there are k consecutive buildings of height at least k.

The mayor has asked for your help to determine the largest size of artwork that can be installed.

Input

The first line of input consists of a single integer n, representing the number of buildings. The second line of input consists of n space-separated integers, $h_1, h_2, \ldots, h_n$, representing the heights of the buildings.

Constraints

All input will satisfy the following constraints:

- $1 \leq n \leq 100,000$.
- For all $1 \leq i \leq n$, $1 \leq h_i \leq n$.

Output

Output one integer, the side length of the largest possible square artwork that can be placed in front of the buildings.

Subtasks

B1 (50 points): $1 \leq n \leq 5,000$.

B2 (50 points): no restrictions.

Sample Input 1

```
4
1 4 3 3
```

Sample Output 1

```
3
```

Sample Input 2

```
5
4 5 2 4 5
```

Sample Output 2

```
2
```

Explanation

In sample case 1, a square of size 3 can be placed in front of the last three buildings.

In sample case 2, there are four ways to place a square of size 2, but no larger square is possible.

C. Superstore

Time Limit: 1 second

Points: 100

Glenn is the manager of a store. There are n shoppers in the store (numbered 1 to n) and k checkout lanes. Glenn has far too much time on his hands, and starts planning for the worst possible scenario, in which all shoppers approach the checkouts immediately. Of course, in such a situation every lane would be used by at least one shopper, so exactly k lanes are formed.

Glenn wants your help to calculate the number of orders in which k queues can form, modulo 10^9+7. He has the power to reorder the checkout staff, so swapping two entire queues does not constitute a different arrangement. However, he must take into account all orderings of the shoppers within any line.

Input

The only line of input consists of two integers, n and k, representing the number of shoppers and the number of checkout lanes respectively.

Constraints

All input will satisfy the following constraints:

- $1 \leq k \leq n \leq 1,000$.

Output

Output one integer, the number of arrangements of the shoppers into k lanes, modulo $10^9 + 7$.

Subtasks

C1 (50 points): $1 \leq k \leq 2$.

C2 (50 points): no restrictions.

Sample Input 1

```
3 2
```

Sample Output 1

```
6
```

Sample Input 2

```
4 1
```

Sample Output 2

```
24
```

Sample Input 3

```
4 3
```

Sample Output 3

```
12
```

Explanation

In sample case 1, there are three shoppers and two checkout lanes. The six arrangements are as follows:

1. Shopper 1 in one lane, shopper 2 and then shopper 3 in the other lane.
2. Shopper 1 in one lane, shopper 3 and then shopper 2 in the other lane.
3. Shopper 2 in one lane, shopper 1 and then shopper 3 in the other lane.
4. Shopper 2 in one lane, shopper 3 and then shopper 1 in the other lane.
5. Shopper 3 in one lane, shopper 1 and then shopper 2 in the other lane.
6. Shopper 3 in one lane, shopper 2 and then shopper 1 in the other lane.

Note that the order of the lanes is not important, but the order of the shoppers within any one line is important.

In sample case 2, there are four shoppers and only one lane. The shoppers can line up in 24 ways in this lane.

In sample case 3, there are four shoppers and three lanes. The shoppers can line up in 12 ways. Note that sample case 3 is not a valid input for subtask C1.