Queries with Fixed Length

HackerRank

Consider an n-integer sequence, $A = \{a_0, a_1, \ldots, a_{n-1}\}$. We perform a query on A by using an integer, d, to calculate the result of the following expression:

$$\min_{0 \le i \le n-d} \left(\max_{i \le j < i+d} a_j \right)$$

In other words, if we let $m_i = \max(a_i, a_{i+1}, a_{i+2}, \ldots, a_{i+d-1})$, then you need to calculate $\min(m_0, m_1, \ldots, m_{n-d})$.

Given arr and q queries, return a list of answers to each query.

Example
$arr = [2, 3, 4, 5, 6]$
$queries = [2, 3]$

The first query uses all of the subarrays of length 2: $[2, 3], [3, 4], [4, 5], [5, 6]$. The maxima of the subarrays are $[3, 4, 5, 6]$. The minimum of these is 3.

The second query uses all of the subarrays of length 3: $[2, 3, 4], [3, 4, 5], [4, 5, 6]$. The maxima of the subarrays are $[4, 5, 6]$. The minimum of these is 4.

Return $[3, 4]$.

Function Description

Complete the *solve* function below.

solve has the following parameter(s):

- *int arr[n]:* an array of integers
- *int queries[q]:* the lengths of subarrays to query

Returns

- *int[q]:* the answers to each query

Input Format

The first line consists of two space-separated integers, n and q.
The second line consists of n space-separated integers, the elements of arr.
Each of the q subsequent lines contains a single integer denoting the value of d for that query.

Constraints

- $1 \le n \le 10^5$

- $0 \leq arr[i] < 10^6$
- $1 \leq q \leq 100$
- $1 \leq d \leq n$

Sample Input 0

```
5 5
33 11 44 11 55
1
2
3
4
5
```

Sample Output 0

```
11
33
44
44
55
```

Explanation 0

For $d = 1$, the answer is

$$\min(\max(a_0), \max(a_1), \max(a_2), \max(a_3), \max(a_4)) = 11$$

.
For $d = 2$, the answer is

$$\min(\max(a_0, a_1), \max(a_1, a_2), \max(a_2, a_3), \max(a_3, a_4)) = 33$$

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For $d = 3$, the answer is

$$\min(\max(a_0, a_1, a_2), \max(a_1, a_2, a_3), \max(a_2, a_3, a_4)) = 44$$

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For $d = 4$, the answer is

$$\min(\max(a_0, a_1, a_2, a_3), \max(a_1, a_2, a_3, a_4)) = 44$$

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For $d = 5$, the answer is

$$\min(\max(a_0, a_1, a_2, a_3, a_4)) = 55$$

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Sample Input 1

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

```
4
5
```

Sample Output 1

```
1
2
3
4
5
```

Explanation 1

For each query, the "prefix" has the least maximum value among the consecutive subsequences of the same size.