Problem G: Greedy Grouping

Given an array A with n elements $a_1, a_2, \ldots, a_n$ and an integer k, select a set of segments satisfying the following conditions:

- Each segment consists of consecutive elements of A,
- Each segment has at least k elements,
- The elements within each segment are pairwise distinct,
- No two segments share any elements, i.e. each element of A appears in at most one segment.

Your task is to determine the maximum number of such segments, and compute the number of ways to select the segments to achieve that maximum number.

Two ways are considered different if either of the following conditions hold:

- There exists an element a_i which belongs to some segment in one way, but does not belong to any segments in the other way.
- There exists two elements a_i and a_j which belong to the same segment in one way, but belong to different segments in the other way.

To make the problem a little bit more challenging, you are also given q integers $l_1, l_2, \ldots, l_q$. For each value l_i, you need to solve the above problem where $k = l_i$.

Input

The first line of the input contains an integer t, the number of test cases.

Each test case consists of three lines:

- The first line contains two integers n and q ($1 \le n \le 666\,666, 1 \le q \le 333$).
- The second line contains n integers $a_1, a_2, \ldots, a_n$ ($1 \le a_i \le 999\,999\,999$).
- The third line contains q integers $l_1, l_2, \ldots, l_q$ ($1 \le l_i \le n$).

It is guaranteed that:

- The sum of n over all testcases does not exceed $666\,666$.
- The sum of q over all testcases does not exceed $666\,666$.

Output

For each test case, output q lines. The i-th one among them contains results of the above problem where $k = l_i$, which are represented by two space-separated integers:

- The first one is the maximum number of segments that can be selected.
- The second one is the number of ways to select segments to achieve that maximum number, modulo $998\,244\,353$.

Sample Explanation

Denote $[l, r]$ the segment containing all elements $a_l, a_{l+1}, \ldots, a_r$.

In the first test case:

- When $k = 2$, we can select at most 2 segments. There are 3 valid solutions:
  1. $[1, 2]$ and $[3, 4]$.
  2. $[1, 2]$ and $[4, 5]$.
  3. $[2, 3]$ and $[4, 5]$.
- When $k = 3$, no segments of length at least k contains pairwise distinct elements.

In the second test case:

- When $k = 3$, we can select at most 2 segments. The only valid solution contains two semgents $[1, 3]$ and $[4, 6]$.
- When $k = 5$, we can select only one segment. It can be any of the following: $[1, 5]$ $[2, 6]$, and $[1, 6]$.

Sample Input 1	Sample Output 1
2 5 2 1 2 1 2 1 2 3 6 2 1 2 3 4 5 6 3 5	2 3 0 1 2 1 1 3