D. Maxim and Increasing Subsequence

time limit per test: 6 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

Maxim loves sequences, especially those that strictly increase. He is wondering, what is the length of the longest increasing subsequence of the given sequence a?

Sequence a is given as follows:

- the length of the sequence equals $n \times t$;
- $(1 \le i \le n \times t)$, where operation means taking the remainder after dividing number x by number y.

Sequence $s_1, s_2, \ldots, s_r$ of length r is a *subsequence* of sequence $a_1, a_2, \ldots, a_n$, if there is such increasing sequence of indexes $i_1, i_2, \ldots, i_r$ $(1 \le i_1 < i_2 < \ldots < i_r \le n)$, that $a_{i_j} = s_j$. In other words, the subsequence can be obtained from the sequence by crossing out some elements.

Sequence $s_1, s_2, \ldots, s_r$ is *increasing*, if the following inequality holds: $s_1 < s_2 < \ldots < s_r$.

Maxim have k variants of the sequence a. Help Maxim to determine for each sequence the length of the longest increasing subsequence.

Input

The first line contains four integers k, n, $maxb$ and t $(1 \le k \le 10;\ 1 \le n, maxb \le 10^5;\ 1 \le t \le 10^9;\ n \times maxb \le 2 \cdot 10^7)$. Each of the next k lines contain n integers $b_1, b_2, \ldots, b_n$ $(1 \le b_i \le maxb)$.

Note that for each variant of the sequence a the values n, $maxb$ and t coincide, the only arrays bs differ.

The numbers in the lines are separated by single spaces.

Output

Print k integers — the answers for the variants of the sequence a. Print the answers in the order the variants follow in the input.

Examples

input
3 3 5 2 3 2 1 1 2 3 2 3 1

output
2 3 3