COCI '15 Contest 5 #6 Podnizovi

Time limit: 0.6s **Memory limit:** 256M

You are given an array of integers of length N. Let $s_1, s_2, \ldots, s_q$ be the **lexicographically sorted** array of all its non-empty subsequences. A subsequence of the array is an array obtained by removing zero or more elements from the initial array. Notice that some subsequences can be equal and that it holds $q = 2^N - 1$.

An array A is lexicographically smaller than array B if $A_i < B_i$ where i is the first position at which the arrays differ, or if A is a strict prefix of array B.

Let us define the hash of an array that consists of values $v_1, v_2, \ldots, v_p$ as:

$$h(s) = (v_1 \cdot B^{p-1} + v_2 \cdot B^{p-2} + \cdots + v_{p-1} \cdot B + v_p) \bmod M$$

where B, M are given integers.

Calculate $h(s_1), h(s_2), \ldots, h(s_K)$ for a given K.

Input

The first line contains integers N, K, B, M $(1 \leq N \leq 100\,000, 1 \leq K \leq 100\,000, 1 \leq B, M \leq 1\,000\,000)$.

The second line contains integers $a_1, a_2, \ldots, a_N$ $(1 \leq a_i \leq 100\,000)$.

In all test cases, it will hold $K \leq 2^N - 1$.

Output

Output K lines, the j^{th} line containing $h(s_j)$.

Scoring

In test cases worth 60% of total points, it will additionally hold $1 \leq a_1, a_2, \ldots, a_N \leq 30$.

Sample Input 1

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

Sample Output 1

```
1
3
2
```

Explanation for Sample 1

It holds: $s_1 = [1]$, $s_2 = [1, 2]$, $s_3 = [2]$. $h(s_1) = 1 \bmod 5 = 1$, $h(s_2) = (1 + 2) \bmod 5 = 3$, $h(s_3) = 2 \bmod 5 = 2$.

Sample Input 2

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

Sample Output 2

```
1
1
0
2
```

Explanation for Sample 2

It holds: $s_1 = [1]$, $s_2 = [1]$, $s_3 = [1, 1]$, $s_4 = [1, 3]$. $h(s_1) = 1 \bmod 3 = 1$, $h(s_2) = 1 \bmod 3 = 1$,
$h(s_3) = (1 \cdot 2 + 1) \bmod 3 = 0$, $h(s_4) = (1 \cdot 2 + 3) \bmod 3 = 2$.

Sample Input 3

```
5 6 23 1000
1 2 4 2 3
```

Sample Output 3

```
1
25
25
577
274
578
```