

You are given an array of integers of length N . Let s_1, s_2, \dots, 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, \dots, v_p as:

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

where B, M are given integers.

Calculate $h(s_1), h(s_2), \dots, h(s_K)$ 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 $a_1, a_2, a_3, \dots, a_N$ ($1 \leq a_i \leq 100\,000$).

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 $1 \leq a_1, a_2, \dots, a_N \leq 30$.

SAMPLE TESTS

<p>input</p> <p>2 3 1 5 1 2</p> <p>output</p> <p>1 3 2</p>	<p>input</p> <p>3 4 2 3 1 3 1</p> <p>output</p> <p>1 1 0 2</p>	<p>input</p> <p>5 6 23 1000 1 2 4 2 3</p> <p>output</p> <p>1 25 25 577 274 578</p>
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Clarification of the first example: It holds: $s_1 = [1], s_2 = [1, 2], s_3 = [2]$. $h(s_1) = 1 \bmod 5 = 1, h(s_2) = (1 + 2) \bmod 5 = 3, h(s_3) = 2 \bmod 5 = 2$.

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