A *cellular automaton* is a collection of cells on a grid of specified shape that evolves through a number of discrete time steps according to a set of rules that describe the new state of a cell based on the states of neighboring cells. The *order of the cellular automaton* is the number of cells it contains. Cells of the automaton of order n are numbered from 1 to n.

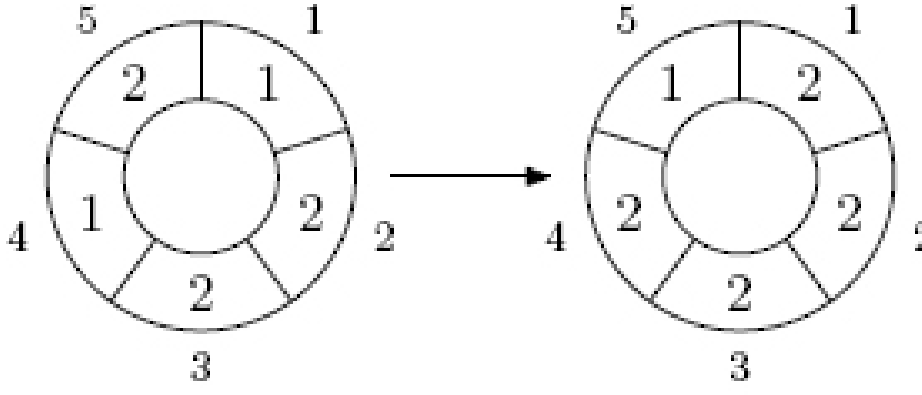
The *order of the cell* is the number of different values it may contain. Usually, values of a cell of order m are considered to be integer numbers from 0 to $m-1$.

One of the most fundamental properties of a cellular automaton is the type of grid on which it is computed. In this problem we examine the special kind of cellular automaton — circular cellular automaton of order n with cells of order m. We will denote such kind of cellular automaton as $n, m-$ *automaton*.

A distance between cells i and j in n, m-automaton is defined as $\min(|i-j|, n-|i-j|)$. A *d-environment of a cell* is the set of cells at a distance not greater than d.

On each *d-step* values of all cells are simultaneously replaced by new values. The new value of cell i after d-step is computed as a sum of values of cells belonging to the d-enviroment of the cell i modulo m.

The following picture shows 1-step of the 5,3-automaton.



The problem is to calculate the state of the n, m-automaton after k d-steps.

Input

The input file contains several test cases, each of them consists of two lines, as described below.

The first line of the input contains four integer numbers n, m, d, and k ($1 \le n \le 500$, $1 \le m \le 1000000$, $0 \le d < \frac{n}{2}$, $1 \le k \le 10000000$). The second line contains n integer numbers from 0 to $m-1$ — initial values of the automaton's cells.

Output

For each test case, write to the output, on a line by itself, the values of the n, m-automaton's cells after k d-steps.

Sample Input

```
5 3 1 1
1 2 2 1 2
5 3 1 10
1 2 2 1 2
```

Sample Output

```
2 2 2 2 1
2 0 0 2 2
```