

## 3704 Cellular Automaton

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  $n$ .

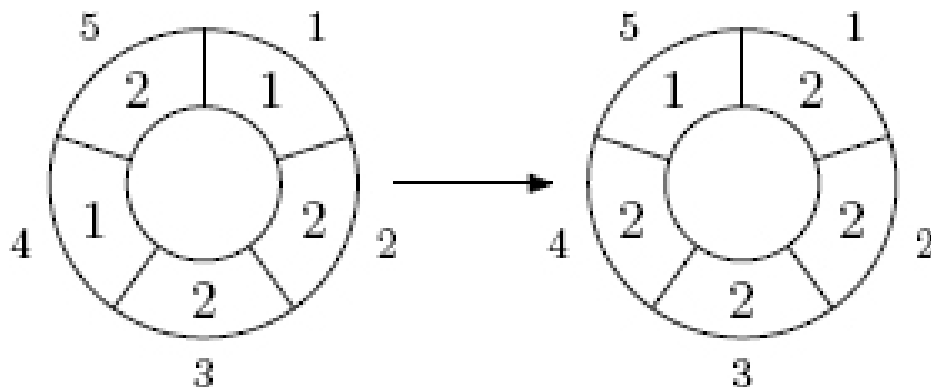
The *order of the cell* is the number of different values it may contain. Usually, values of a cell of order  $m$  are considered to be integer numbers from 0 to  $m - 1$ .

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  $d$ -environment 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  $k$  ( $1 \leq n \leq 500$ ,  $1 \leq m \leq 1000000$ ,  $0 \leq d < \frac{n}{2}$ ,  $1 \leq k \leq 10000000$ ). 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
```