# 3704 - Cellular Automaton

**Europe - Northeastern Europe & Russian Republic - 2006/2007**

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 $n$ .

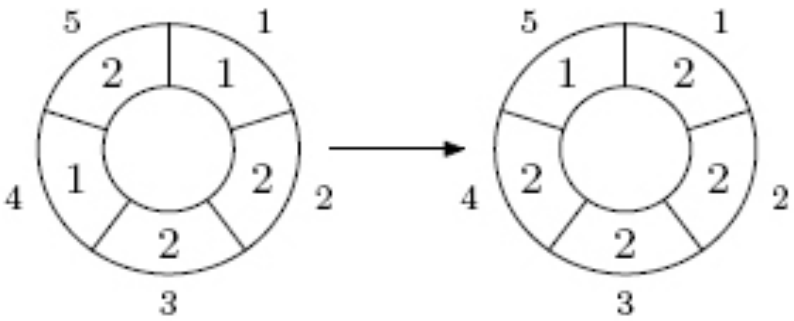
The order of the cell is the number of different values it may contain. Usually, values of a cell of order $m$ are considered to be integer numbers from 0 to $m$ - 1 .

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 $k$ ($1 \leq n \leq 500$, $1 \leq m \leq 1000000$, $0 \leq d < \frac{n}{2}$, $1 \leq k \leq 10000000$) . The second line contains $n$ integer numbers 2 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
```

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