E. Willem, Chtholly and Seniorious

time limit per test: 2 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

— Willem...

— What's the matter?

— It seems that there's something wrong with Seniorious...

— I'll have a look...

Seniorious is made by linking special talismans in particular order.

After over 500 years, the carillon is now in bad condition, so Willem decides to examine it thoroughly.

Seniorious has n pieces of talisman. Willem puts them in a line, the i-th of which is an integer a_i.

In order to maintain it, Willem needs to perform m operations.

There are four types of operations:

- $1\ l\ r\ x$: For each i such that $l \le i \le r$, assign $a_i + x$ to a_i.
- $2\ l\ r\ x$: For each i such that $l \le i \le r$, assign x to a_i.
- $3\ l\ r\ x$: Print the x-th smallest number in the index range $[l, r]$, i.e. the element at the x-th position if all the elements a_i such that $l \le i \le r$ are taken and sorted into an array of non-decreasing integers. It's guaranteed that $1 \le x \le r - l + 1$.
- $4\ l\ r\ x\ y$: Print the sum of the x-th power of a_i such that $l \le i \le r$, modulo y, i.e. .

Input

The only line contains four integers $n, m, seed, v_{max}$ ($1 \le n, m \le 10^5, 0 \le seed < 10^9 + 7, 1 \le vmax \le 10^9$).

The initial values and operations are generated using following pseudo code:

```
def rnd():

    ret = seed
    seed = (seed * 7 + 13) mod 1000000007
    return ret

for i = 1 to n:

    a[i] = (rnd() mod vmax) + 1

for i = 1 to m:

    op = (rnd() mod 4) + 1
    l = (rnd() mod n) + 1
    r = (rnd() mod n) + 1
```

```
if (l > r):
     swap(l, r)

if (op == 3):
    x = (rnd() mod (r - l + 1)) + 1
else:
    x = (rnd() mod vmax) + 1

if (op == 4):
    y = (rnd() mod vmax) + 1
```

Here op is the type of the operation mentioned in the legend.

Output

For each operation of types 3 or 4, output a line containing the answer.

Examples

input
10 10 7 9

output
2 1 0 3

input
10 10 9 9

output
1 1 3 3

Note

In the first example, the initial array is $\{8, 9, 7, 2, 3, 1, 5, 6, 4, 8\}$.

The operations are:

- 2 6 7 9
- 1 3 10 8
- 4 4 6 2 4
- 1 4 5 8
- 2 1 7 1
- 4 7 9 4 4
- 1 2 7 9
- 4 5 8 1 1
- 2 5 7 5
- 4 3 10 8 5