Program Optimization

Input file:	`standard input`
Output file:	`standard output`
Time limit:	2 seconds
Memory limit:	256 megabytes

Consider the following C++ code:

```
#include <algorithm>
#include <random>

int query_mex(const int *a, int l, int r);

int simulate(int n, int *a, int q, int k, int s) {
  std::mt19937 gen;
  gen.seed(s);
  int last = 0;
  while (q--) {
    int op = gen() % k;
    int i = (gen() + last) % n;
    if (!op && i) {
      std::swap(a[i - 1], a[i]);
    } else {
      int j = gen() % k;
      last ^= query_mex(a, std::min(i, j), std::max(i, j));
    }
  }
  return last;
}
```

In the program, `query_mex(a, l, r)` returns the minimum non-negative integers which does not occur in $a_l, a_{l+1}, \ldots, a_r$.

Given the value of n, a, q, k and s, find the returned value of the function.

Input

The first line contains four integers n, q, k and s ($1 \le n \le 2 \times 10^5$, $1 \le q \le 10^7$, $1 \le k \le 10^9$, $0 \le s \le 10^9$). The second line contains n distinct integers $a_0, a_1, \ldots, a_{n-1}$ ($0 \le a_i < n$).

Output

Output an integer denoting the returned value.

Example

standard input	standard output
3 5 1 0 0 1 2	3