E - Musical Sequences

Attempted by: 525 / Accuracy: 60% / Maximum Score: 30 / 31 Votes

Tag(s): Easy-Medium

SOLVE LATER

Valentina had a birthday recently. She got a special piano from parents. They told her about the piano melodies and the connection with the mathematical sequences. She got amazed and started to use piano keys to create her own musical sequences.

The piano has *m* keys, numbered *0* through $m-1$.

Valentina has already hit *n* keys $a_0, a_1, \ldots, a_{n-1}$ $(0 \le a_i \le m-1)$, not necessarily distinct. To get a nice melody, each next key to hit must be chosen according to the following formula for $k \ge n$:
$a_k = \left(\sum_{i=1}^{n} (-1)^{i+1} \cdot a_{k-i}\right) \% m$ where $\%$ denotes the modulo operation.

E.g., for $n = 4$ it is $a_k = \left(a_{k-1} - a_{k-2} + a_{k-3} - a_{k-4}\right) \% m$.

Given *n*, *m* and *z*, are you able to find a_z, i.e. the *z*-th key hit by Valentina?

Input format

The first line of the input contains one integer *T* denoting the number of test cases.

The first line of each test case description contains three integers *n*, *m* and *z*.

The second line contains *n* integers $a_0, a_1, \ldots, a_{n-1}$ denoting keys already hit by Valentina.

Output format

For each test case, output the answer in a separate line.

Constraints

- $1 \le T \le 10$
- $1 \le n \le 10^5$
- $2 \le m \le 10^9$
- $0 \le a_i \le m-1$
- $n \le z \le 10^{18}$

Subtasks

Extra constraints	Points	Which tests
$z \le 10^6$	30	1-3
$n \le 10$	40	4-7
no extra constraints	30	8-10

SAMPLE INPUT

```
3
4 10 4
1 3 3 7
4 10 5
1 3 3 7
1 2 12345678987654321
1
```

SAMPLE OUTPUT

```
6
9
1
```

Explanation

In the first sample test case, we know the first $n = 4$ keys hit by Valentina $a_0 = 1, a_1 = 3, a_2 = 3, a_3 = 7$. We are asked to find a_4. According to the given formula,
$a_4 = (a_3 - a_2 + a_1 - a_0) \% m = (7 - 3 + 3 - 1) \% 10 = 6$.

In the second sample test case, we are given the same first keys but we are asked to find a_5 this time. So,
$a_5 = (a_4 - a_3 + a_2 - a_1) \% m = (6 - 7 + 3 - 3) \% 10 = 9$.

In the third sample test case, Valentina will hit the same key over and over, i.e. $a_0 = a_1 = a_2 = \ldots = 1$.

Stack Limit for C++ is 8MB. You are allowed to increase it in your code, e.g. using setrlimit().

Time Limit:	3.0 sec(s) for each input file.
Memory Limit:	256 MB
Source Limit:	1024 KB
Marking Scheme:	Marks are awarded when all the testcases pass.
Allowed Languages:	Bash, C, C++, C++14, Clojure, C#, D, Erlang, F#, Go, Groovy, Haskell, Java, Java 8, JavaScript(Rhino), JavaScript(Node.js), Julia, Kotlin, Lisp, Lisp (SBCL), Lua, Objective-C, OCaml, Octave, Pascal, Perl, PHP, Python, Python 3, R(RScript), Racket, Ruby, Rust, Scala, Swift, Swift-4.1, Visual Basic

BEST SUBMISSIONS

LANGUAGE: Bash

There is no solution for this language

VIEW ALL SUBMISSION

CONTRIBUTOR

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THIS PROBLEM WAS ASKED IN

CHALLENGE NAME
IndiaHacks: Algorithms

SOCIAL SHARE

LIVE EVENTS 9

CODE EDITOR

Enter your code or Upload your code as file. Save Java 8 (oracle 1.8.0_131)

```
import java.util.Scanner;
import java.lang.StrictMath;

class TestClass {
    public static void main(String args[] ) throws Exception {
        int T,n;
        int m,z,res=0;
        int array[];
        Scanner s = new Scanner(System.in);

        while(T>0){

            T=s.nextInt();
            n=s.nextInt();
            m=s.nextInt();
            z=s.nextInt();
            array=new int[n];

            for(long i=0;i<n;i++){
                array[i]=s.nextInt();
            }

            for(long i=1;i<=n;i++){
                res=StrictMath.pow(-1,i+1)*array[z-i];
            }

            res=res%m;
            System.out.print(res);
            T--;
        }
    }
}
```

1:1

Press Ctrl/Command+Spacebar for autocomplete suggestions (accuracy dependent on connection stability).

Provide custom input

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