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Sereja and Random Array



Problem code: SEAPROAR



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MY SUBMISSIONS

SUBMIT

Read problems statements in [Mandarin Chinese](#) and [Russian](#).

Sereja likes to generate pseudo random binary sequences. Now Sereja has two generators: one is a based on linear congruential generators (LCGs) and another is based on Xorshift.

Sereja has some binary sequences generated in past times, and he wants to know which generator makes these sequences. You can know the details of Sereja's generators, then can you answer this problem?

The following is the details. We may give the length **N** and a seed integer **S** to the generators, then they generate a binary sequence **A[1], A[2], ..., A[N]**.

The 1st generator works as follows (C++ code. If you are not familiar with C++, please see the below section **Notes for C++**):

```
/* ----- start here ----- */
unsigned X; // we assume that unsigned is a 32bit integer type
```

```
void srand1(unsigned S){
    X = S;
}
```

```
unsigned nextInteger1(void){
    X = X * 1103515245 + 12345;
    return (X / 65536) % 32768;
}
```

```
void generator1(int N, unsigned S, int A[]){
    srand1(S);
    for(int i=1; i<=N; i++){
        A[i] = nextInteger1() % 2;
    }
}
/* ----- end here ----- */
```

The 2nd generator works as follows (C++ code):

```
/* ----- start here ----- */
unsigned x, y, z, w; // we assume that unsigned is a 32bit integer type
```

```
void srand2(unsigned S){
    x = S;
    y = x * S;
    z = y * S;
    w = z * S;
}
```

```
unsigned nextInteger2(void){
    unsigned t = x ^ (x << 11);
    x = y; y = z; z = w;
    return w = (w ^ (w >> 19)) ^ (t ^ (t >> 8));
}
```

```
void generator2(int N, unsigned S, int A[]){
    srand2(S);
    for(int i=1; i<=N; i++){
        A[i] = nextInteger2() % 2;
    }
}
/* ----- end here ----- */
```

Note that the LCG used in the 1st generator is the same one suggested in ISO/IEC 9899 (pp. 346–347), and Xorshift used in the 2nd generator is the same one in the paper by Marsaglia (July 2003).

Input

The first line of input contains an integer **T**, denoting the number of test cases. Then **T** test cases follow.

Each test case has only one line. The line contains the string of length **N**, denoting the array **A[1], A[2], ..., A[N]**, where the string consists of only characters '0' and '1', and the i^{th} character denotes **A[i]**.

Note that the integer **N** is not given in the input explicitly.

Output

SUCCESSFUL SUBMISSIONS

User	Score	Mem	Lang	Solution
avmnusng	100.000	2.1M	C	View
gvaibhav21	100.000	2.1M	C	View
mediocoder	100.000	2.1M	C	View
npriyadarshi	100.000	2.2M	C	View
additya1998	100.000	2.8M	C++ 4.3.2	View
mgch	100.000	2.8M	C++ 4.3.2	View
ishraq	100.000	2.9M	C++ 4.3.2	View
rajat1603	100.000	2.9M	C++ 4.3.2	View
manish05	100.000	3M	C++ 4.3.2	View
shashank_kgp	100.000	3.1M	C++ 4.9.2	View
ashish1610	100.000	3.2M	C++ 4.9.2	View
xorfire	100.000	3.2M	C++14	View

1 of 6

Next »

For each test case, print "LCG" if the given sequence generated by the 1st generator, or print "Xorshift" if the given sequence is generated by the 2nd generator.

Constraints and Subtasks

- $1 \leq t \leq 30$
- There is no pair of integers (s, t) such that $0 \leq s, t \leq 10^9$ and both **generator1**(N, s, A) and **generator2**(N, t, A) generate the given sequence. (Thus the answer will be determined uniquely)

Subtask 1 (10 points)

- $50 \leq N \leq 500$
- There is an integer $0 \leq s \leq 500$ such that **generator1**(N, s, A) or **generator2**(N, s, A) generates the given sequence.

Subtask 2 (40 points)

- $500 \leq N \leq 100000$
- There is an integer $0 \leq s \leq 31313$ such that **generator1**(N, s, A) or **generator2**(N, s, A) generates the given sequence.

Subtask 3 (20 points)

- $100000 \leq N \leq 200000$
- There is an integer $0 \leq s \leq 10^9$ such that **generator1**(N, s, A) or **generator2**(N, s, A) generates the given sequence.

Subtask 4 (30 points)

- $500 \leq N \leq 200000$
- There is an integer $0 \leq s \leq 10^9$ such that **generator1**(N, s, A) or **generator2**(N, s, A) generates the given sequence.

Example

Input:

6

```

1101100100101111010011010101110100001000000101001110101011010101010
0001011011101010111101001011100000001100110110101
101010100010110001010101011100001000111001001011110010010110000001100110
010101010011100111101001010010100100111000111110
00000000000000000000000010010010101010111110101010
111010101010000000111101001111111000010000111010011111000001111

```

Output:

LCG
LCG
LCG
Xorshift
Xorshift
Xorshift

Explanation

Example 1. `generator1(67, 5, A)` generates the given sequence.

Example 2. `generator1(51, 8, A)` generates the given sequence.

Example 3. `generator1(77, 58, A)` generates the given sequence.

Example 4. `generator2(50, 5, A)` generates the given sequence.

Example 5. `generator2(55, 8, A)` generates the given sequence.

Example 6. `generator2(62, 58, A)` generates the given sequence.

Notes for C++

At first, in the codes, almost every operation will be done with unsigned.

Thus operations will return the result modulo 2^{32} .

For example,

$$X * 1103515245 + 12345$$

means that

$$(X \times 1103515245 + 12345) \bmod 2^{32}$$

and

(X / 65536) % 32768

means that

$$(\text{floor}(X / 65536) \bmod 32768) \bmod 2^{32}$$

in terms of mathematical notations.

Then there are some bit operations in the 2nd generator.

The operators << and >> denote bit shifts.

For example,

 $X \ll 15$

means that

$$(X \times 2^{15}) \bmod 2^{32},$$

and

$X \gg 13$
means that
 $\text{floor}(X / 2^{13})$.

And the operator ^ denotes bitwise XOR.

Author:	sereja
Tester:	laycourse
Date Added:	29-11-2014
Time Limit:	1 sec
Source Limit:	50000 Bytes
Languages:	ADA, ASM, BASH, BF, C, C99 strict, CAML, CLOJ, CLPS, CPP 4.3.2, CPP 4.9.2, CPP14, CS2, D, ERL, FORTRAN, FS, GO, HASK, ICK, ICON, JAVA, JS, LISP clisp, LISP sbcl, LUA, NEM, NICE, NODEJS, PAS fpc, PAS gpc, PERL, PERL6, PHP, PIKE, PRLG, PYTHON, PYTH 3.1.2, RUBY, SCALA, SCM guile, SCM qobi, ST, TCL, TEXT, WSPC

SUBMIT

Comments

cyberax @ 6 Mar 2015 03:58 PM

@admin: why lines are 0-prefixed ?

dpraveen @ 6 Mar 2015 04:16 PM

@cyberax: Can you please explain your query in more detail?

cyberax @ 6 Mar 2015 05:02 PM

@admin: Input section "The line contains the string of length N, denoting the array A[1], A[2], ..., A[N]". But there is a '0' before (probably related to A[0]). Thus it's A[0] to A[N-1], not A[1] to A[N].

dpraveen @ 6 Mar 2015 05:23 PM

@cyberax: No, everything is as it is stated in the problem statement.

laycourse @ 6 Mar 2015 08:32 PM

Sorry, it seems my mistakes. I'll fix it as soon as possible.

laycourse @ 6 Mar 2015 08:59 PM

I have fixed the judge test cases. The statements will be fixed soon. And the submissions will be rejudged.

The	sample	input	should	be
110110010010111010011010111010000100000010011101010110101010				6
0001010111010101110100101100000000110010101010101				
11010100010110001010101011001100001000110010010011110010010110000001100110				
01011010100111100111101001010010100100111000111110				
000000000000000000000000000100100101010100111110101010				
111010010100000001111010011111100001000011101001111000001111				

ashish1610 @ 8 Mar 2015 01:56 AM

Nice problem :)

Need help? Post a comment. But before that please spare a moment to read the [guidelines](#).

Your name:
shubhmsng

Comment: *

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The time now is: 06:04:53 PM
Your Ip: 106.76.150.49

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