A.LGM

Description

Satori is an LGM, so she decided to play a card game with herself, irotaS.

Satori found herself many cards. There are totally 4 types of cards. According to today's weather, both Satori and irotaS can consume 2 cards to produce 1 new card of certain type.

Formally speaking, given a 4×4 symmetric matrix T whose entries are among $0, 1, 2, 3$ (the matrix index starts from 0). $T_{i,j} = k$ means that consuming one type i card and one type j card will produce a type k card. Some of the combinations are invalid and $k = -1$ for these cases.

Satori and irotaS take turns to move. Satori moves first. In each move, the operator consumes two cards and produce a new one according to the matrix. The player who cannot move loses the game.

Satori and irotaS decide to play Q rounds today. In round i, she has $a_{i,0}, a_{i,1}, a_{i,2}, a_{i,3}$ cards for each type respectively. They wonder who will win the game in each round.

Input format

The first 4 lines describe today's transformation matrix. Each line contains 4 numbers ranged from 0 to 3. It is guaranteed that the matrix is symmetric.

The next line contains an integer Q.

For the following Q lines, each line contains 4 integers $a_{i,0}, a_{i,1}, a_{i,2}, a_{i,3}$.

Input format

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For the following Q lines, each line contains 4 integers $a_{i,0}, a_{i,1}, a_{i,2}, a_{i,3}$.

Output format

Output Q lines. For the i^{th} line, output **`Satori`** if Satori wins in round i, otherwise output **`irotaS`**.

Samples

Sample 1 Input

```
3 3 3 3
3 3 3 3
3 3 0 3
3 3 3 -1
3
1 1 0 1
0 1 2 1
0 0 0 2
```

Sample 1 Output

```
Satori
Satori
irotaS
```

Sample 2 Input

```
0 -1 0 -1
-1 -1 2 3
0 2 2 0
-1 3 0 0
10
2 1 4 5
3 4 5 3
2 3 0 3
1 3 5 5
1 3 3 4
5 5 0 0
4 4 0 3
2 1 0 5
3 2 2 4
0 1 5 0
```

Sample 2 Output

```
Satori
irotaS
irotaS
Satori
irotaS
irotaS
Satori
irotaS
irotaS
Satori
```

Sample 3 Input & Output

Please refer to the **`Additional files`** above.

Limitations & Hints

Hints

A situation is **first-hand-win**, if and only if there exists a move that turns the situation into a **first-hand-lose** one.

Limitations

For 100% test cases:

- $-1 \leq T_{i,j} < 4$
- $1 \leq Q \leq 10^5$
- $0 \leq a_{i,j} \leq 20$

B. Let there be love

Description

> And if you don't let go
>
> It's gonna pass you by

FluffyBunny wants to fly N balloons which are initially tied on the ground. She will manually untie balloons one at a time. At any time, if balloon $i-1$ and $i+1$ are both untied, balloon i will untie and fly away automatically. **Note that ballon 1 and ballon n will not fly away automatically.**

Now FluffyBunny wonders the number of ways to fly all the N balloons. Two ways are considered different if either the set of balloons she fly manually is different or the order of balloons she manually fly is different.

As the answer might be extremely large, please output the number modulo M.

Input format

The first line contains two integers N and M.

Output format

Print one integer — the number of ways to turn on the computers modulo M.

Sample Input 3

```
400 234567899
```

Sample Output 3

```
20914007
```

Limitations & Hints

For 100% of the test case:

- $3 \leq N \leq 400$
- $10^8 \leq M \leq 10^9 + 10$
- It is guaranteed that M is a prime number.