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# Counter game



by dheeraj

Problem

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Louise and Richard play a game. They have a counter set to  $N$ . Louise gets the first turn and the turns alternate thereafter. In the game, they perform the following operations.

- If  $N$  is not a power of 2, reduce the counter by the largest power of 2 less than  $N$ .
- If  $N$  is a power of 2, reduce the counter by half of  $N$ .
- The resultant value is the new  $N$  which is again used for subsequent operations.

The game ends when the counter reduces to 1, i.e.,  $N == 1$ , and the last person to make a valid move wins.

Given  $N$ , your task is to find the winner of the game.

**Update** If they set counter to 1, Richard wins, because its Louise' turn and she cannot make a move.

## Input Format

The first line contains an integer  $T$ , the number of testcases.

$T$  lines follow. Each line contains  $N$ , the initial number set in the counter.

## Constraints

$$1 \leq T \leq 10$$

$$1 \leq N \leq 2^{64} - 1$$

**Note:** Range of  $N$  is larger than `long long int`, consider using `unsigned long long int`.

## Output Format

For each test case, print the winner's name in a new line. So if Louise wins the game, print "Louise". Otherwise, print "Richard". (Quotes are for clarity)

## Sample Input

```
1
6
```

## Sample Output

```
Richard
```

## Explanation

- As 6 is not a power of 2, Louise reduces the largest power of 2 less than 6 i.e., 4, and hence the counter reduces to 2.
- As 2 is a power of 2, Richard reduces the counter by half of 2 i.e., 1. Hence the counter reduces to 1.

As we reach the terminating condition with  $N == 1$ , Richard wins the game.

**Submissions:** 6498

**Max Score:** 30

**Difficulty:** Difficult

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C++



```
1 ▼ #include <cmath>
2  #include <cstdio>
3  #include <vector>
4  #include <iostream>
5  #include <algorithm>
6  using namespace std;
7
8
9 ▼ int main() {
10     /* Enter your code here. Read input from STDIN. Print output to STDOUT */
```

```
11     return 0;  
12 }  
13
```

Line: 1 Col: 1

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