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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

- $1 \leq T \leq 10$
- $1 \leq N \leq 2^{64} - 1$

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.

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Submissions: 13616

Max Score: 30

Difficulty: Medium

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C#



```

1  using System;
2  using System.Collections.Generic;
3  using System.Linq;
4  using System.Text;
5  using System.Numerics;
6
7  class Solution {
8  static void Main(String[] args) {
9      /* Enter your code here. Read input from STDIN. Print output to STDOUT. Your class should be
10 */
11
12     int t = int.Parse(Console.ReadLine());
13
14     //6703734870638684097
15     //7597026128958891522
16     //13174607262084689114
17     //6959712971461184279
18     //12572864054437627553
19
20     while (t-- > 0)
21     {
22         BigInteger n = BigInteger.Parse(Console.ReadLine());
23         // BigInteger n = BigInteger.Parse("6703734870638684097");
24
25         string[] spot2 = { "18446744073709551616", "9223372036854775808",
26 "4611686018427387904", "2305843009213693952", "1152921504606846976", "576460752303423488",
27 "288230376151711744", "144115188075855872", "72057594037927936", "36028797018963968",
28 "18014398509481984", "9007199254740992", "4503599627370496", "2251799813685248", "112589906842624",
29 "562949953421312", "281474976710656", "140737488355328", "70368744177664", "35184372088832",
30 "17592186044416", "8796093022208", "4398046511104", "2199023255552", "1099511627776", "549755813888",
31 "27487906944", "137438953472", "68719476736", "34359738368", "17179869184", "8589934592",
32 "4294967296", "2147483648", "1073741824", "536870912", "268435456", "134217728", "67108864",
33 "33554432", "16777216", "8388608", "4194304", "2097152", "1048576", "524288", "262144", "131072",
34 "65536", "32768", "16384", "8192", "4096", "2048", "1024", "512", "256", "128", "64", "32", "16", "8",
35 "4", "2", "1" };
36
37         BigInteger[] pot2 = Array.ConvertAll(spot2, e => BigInteger.Parse(e));
38
39         string winner = "Richard";
40         while (true)
41         {
42             if (n == 1)
43             {
44                 break;
45             }
46             winner = (winner == "Louise") ? "Richard" : "Louise";
47             if (!pot2.Contains(n))
48             {
49                 BigInteger largest_power = pot2[0];
50                 for (int i = 0; i < pot2.Length; i++)
51                 {
52                     if (pot2[i] < n)
53                     {
54                         largest_power = pot2[i];
55                         break;
56                     }
57                 }
58                 n -= largest_power;
59             }
60             else
61             {
62                 n /= 2;
63             }
64         }
65
66         //Console.WriteLine(n);
67         Console.WriteLine(winner);
68     }
69 }

```

Line: 8 Col: 37

 [Upload Code as File](#)☐ Test against custom input[Run Code](#)[Submit Code](#)

Congrats, you solved this challenge!

✓ Test Case #0
✓ Test Case #3
✓ Test Case #6
✓ Test Case #9
✓ Test Case #12
✓ Test Case #15
✓ Test Case #18

✓ Test Case #1
✓ Test Case #4
✓ Test Case #7
✓ Test Case #10
✓ Test Case #13
✓ Test Case #16
✓ Test Case #19

✓ Test Case #2
✓ Test Case #5
✓ Test Case #8
✓ Test Case #11
✓ Test Case #14
✓ Test Case #17

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