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Surat-395007**

Web Programming and Python (AI104)

Assignment – 3

1. The digital root of a number n is obtained as follows: Add up the digits n to get a new number. Add up the digits of that to get another new number. Keep doing this until you get a number that has only one digit. That number is the digital root. For example, if $n = 45893$, we add up the digits to get $4+5+8+9+3=29$. We then add up the digits of 29 to get $2+9 = 11$. We then add up the digits of 11 to get $1+1 = 2$. Since 2 has only one digit, 2 is our digital root. Write a function that returns the digital root of an integer n . [Note: there is a shortcut, where the digital root is equal to $n \bmod 9$, but do not use that here.]

2. Is Fibo

You are given a integer, N . Write a program to determine if N is an element of the Fibonacci Sequence.

The first few elements of Fibonacci sequence are 0,1,1,2,3,5,8,13..... A Fibonacci sequence is one where every element is a sum of the previous two elements in the sequence. The first two elements are 0 and 1.

Formally:

$$\text{Fib}_0 = 0$$

$$\text{Fib}_1 = 1$$

$$\text{Fib}_n = \text{Fib}_{n-1} + \text{Fib}_{n-2} \text{ for all } n > 1$$

Input Format:

The first lines contains T , number of test cases.

T lines follows. Each line contains an integer N .

Output Format:

Display **IsFibo** if N is a fibonacci number and **IsNotFibo** if it is not a fibonacci number. The output for each test case should be displayed on a new line.

Constraints:

$$1 \leq T \leq 10^5$$

$$1 \leq N \leq 10^{10}$$

Sample Input:

3
5
7

8

Sample Output

IsFibo

IsNotFibo

IsFibo

5 is a fibonacci number given by $\text{Fib}_5 = 3 + 2$

7 is not a fibonacci number

8 is a fibonacci number given by $\text{Fib}_6 = 5 + 3$

3. Utopian Tree

The Utopian tree goes through 2 cycles of growth every year. The first growth cycle occurs during the monsoon, when it doubles in height. The second growth cycle occurs during the summer, when its height increases by 1 meter.

Now, a new Utopian tree sapling is planted at the onset of the monsoon. Its height is 1 meter. Can you find the height of the tree after N growth cycles?

Input Format

The first line contains an integer, T , the number of test cases.

T lines follow. Each line contains an integer, N , that denotes the number of cycles for that test case.

Constraints

$1 \leq T \leq 10$

$0 \leq N \leq 60$

Output Format

For each test case, print the height of the Utopian tree after N cycles.

Sample Input #00:

2

0

1

Sample Input #01:

2

3

4

Sample Output #00:

1

2

Sample Output #01:

6

7

Explanation #00:

There are 2 test cases. When $N=0$, the height of the tree remains unchanged. When $N = 1$, the tree doubles its height as it's planted just before the onset of monsoon.

Explanation #01:

There are 2 test cases.

When $N=0$,

The height of the tree at the end of the 1st cycle = 2

The height of the tree at the end of the 2nd cycle = 3

The height of the tree at the end of the 3rd cycle = 6

When $N = 1$,

The height of the tree at the end of the 1st cycle = 2

The height of the tree at the end of the 2nd cycle = 3

The height of the tree at the end of the 3rd cycle = 6

the height of the tree at the end of the 4th cycle = 7