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1028. Hanoi Tower Sequence

Total: 9962 Accepted: 3113 Rating: 3.3/5.0(32 votes) 0 ▼

Description

Time Limit: 1sec Memory Limit: 32MB

Hanoi Tower is a famous game invented by the French mathematician Edouard Lucas in 1883. We are given a tower of n disks, initially stacked in decreasing size on one of three pegs. The objective is to transfer the entire tower to one of the other pegs, moving only one disk at a time and never moving a larger one onto a smaller.

The best way to tackle this problem is well known: We first transfer the $n-1$ smallest to a different peg (by recursion), then move the largest, and finally transfer the $n-1$ smallest back onto the largest. For example, Fig 1 shows the steps of moving 3 disks from peg 1 to peg 3.

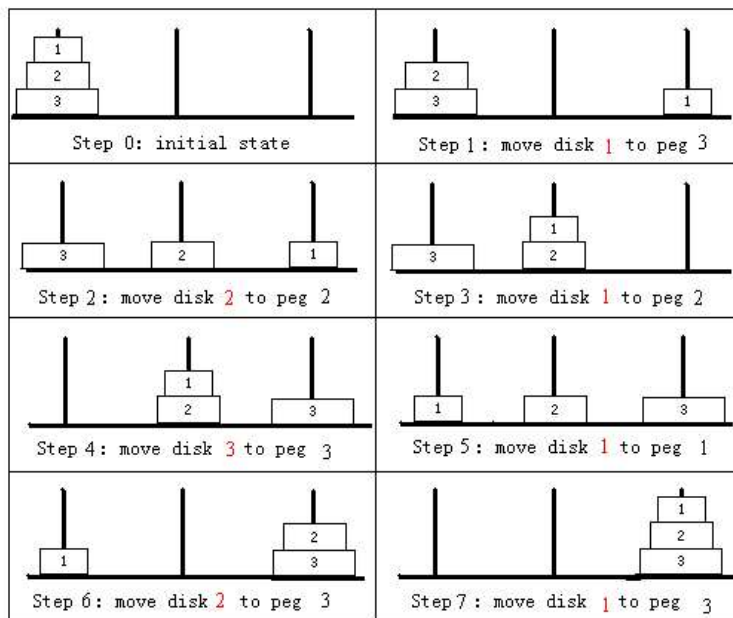


Fig 1: Demo of moving 3 disks from peg 1 to peg 3.

Now we can get a sequence which consists of the red numbers of Fig 1: 1, 2, 1, 3, 1, 2, 1. The i th element of the sequence means the label of the disk that is moved in the i th step. When $n = 4$, we get a longer sequence: 1, 2, 1, 3, 1, 2, 1, 4, 1, 2, 1, 3, 1, 2, 1. Obviously, the larger n is, the longer this sequence will be.

Given an integer p , your task is to find out the p th element of this sequence.

Input

The first line of the input file is T , the number of test cases.
 Each test case contains one integer p ($1 \leq p < 10^{100}$).

Output

Output the p th element of the sequence in a single line. See the sample for the output format.
 Print a blank line between the test cases.

Sample Input

[Copy](#)

 4
 1

```
4
100
1000000000000000
```

Sample Output

Copy

```
Case 1: 1
Case 2: 3
Case 3: 3
Case 4: 15
```

Problem Source: ZSUACM Team Member

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