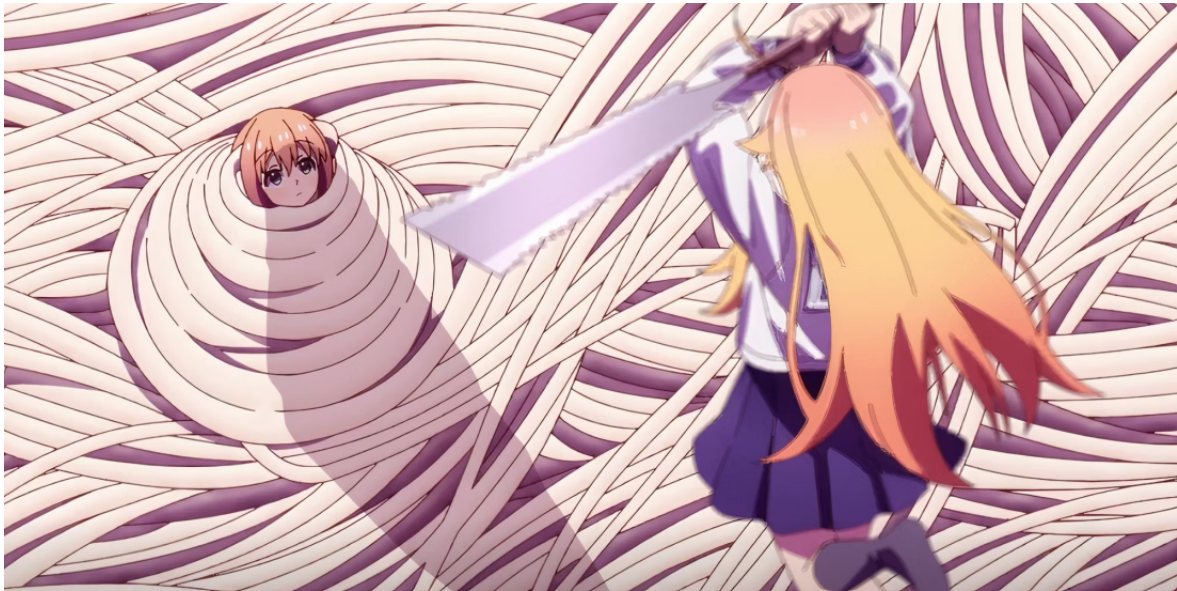# Nokotan's Antlers Won't Stop Growing, So Let's Play a Game on a Binary Tree!

null_awe

1   Problem Statement

Shikanoko Nokonoko Koshitantan: Koshitan attempts to cut off Nokotan's growing antlers.

After failing to cut off Nokotan's growing antlers, Koshitan takes a step back and notices that Nokotan's antlers have actually grown into the form of a complete binary tree with n nodes! So, she decides to play a game.

Koshitan decides to label each of the leaves of the complete binary tree with either 0 or 1. From there on out, she visits unlabeled nodes in decreasing order of depth, and labels each one she visits with the XOR of its children's labels.

She determines that the value of a tree is equal to the number of nodes that are labeled with 1. Before she starts, she wants to know the number of possible values of the tree she can achieve with any initial labeling of leaves.

Please help Koshitan!

2 Input

The first line contains a single integer t ($1 \leq t \leq 10^4$) — the number of test cases.

The first and only line of every test case contains a single integer n ($1 \leq n \leq 5 \times 10^5$) — the number of nodes in the tree.

It is guaranteed that the sum of all n will not exceed 5×10^5.

3 Output

For each test case, output a single integer k — the number of possible values from any initial labeling of tree leaves.

4 Samples

Sample Input 1	Sample Output 1
4 1 2 3 7	2 2 2 5

5 Explanation

In the first test case, we only have one node, so we can only label it either 0 or 1.

In the second test case, the root is linked to the only leaf, so again our value is either 0 or 2 (if the leaf is labeled with 1).

In the third test case, it can be shown that our value is either 0 or 2, and in the last test case, it can be shown that our value is either 0, 2, 3, 4, or 5.