



## Problem D

### Counting Distance Arrays

**Time limit:** 2 seconds

**Memory limit:** 1 GB

#### Problem Description

Given a tree with  $N$  nodes numbered 1 to  $N$ , and a subset of nodes  $S$ , we define an array  $A$  of size  $N$  in the following way:

- $A_i = \max_{x \in S}(\text{dist}(x, i))$ .

Here,  $\text{dist}(x, y)$  represents the number of edges on the unique shortest path between  $x$  and  $y$ .

There are  $2^N - 1$  non-empty subsets  $S$  possible. Find the number of possible distinct arrays  $A$  over all  $2^N - 1$  choices of  $S$ . Since the answer may be large, output it modulo 998244353.

#### Input Format

- The first line of input contains a single integer  $T$ , denoting the number of test cases.
- Each test case consists of multiple lines of input.
  - The first line of each test case contains  $N$  — the number of nodes in the tree.
  - The next  $N - 1$  lines each contain 2 integers  $u$  and  $v$  — representing an edge  $(u, v)$  in the tree.

#### Output Format

For each test case, output on a new line the number of distinct arrays  $A$  possible over all  $2^N - 1$  non-empty subsets  $S$ , modulo 998244353.

#### Constraints

- $1 \leq T \leq 10^4$
- $2 \leq N \leq 2 \cdot 10^5$
- $1 \leq u, v \leq N$
- The set of  $N - 1$  input edges form a tree.
- The sum of  $N$  does not exceed  $2 \cdot 10^5$  over all test cases.



## Samples

### Sample Input 1

```
3
2
1 2
3
1 2
2 3
7
1 2
2 3
2 4
3 5
1 6
5 7
```

### Sample Output 1

```
3
6
23
```

### Sample Explanation

**Test Case 1:** There are 3 subsets  $S$  possible. Each of them produces a distinct result, enumerated as follows:

- $S = \{1\}$ , the array  $A = [0, 1]$
  - $S = \{2\}$ , the array  $A = [1, 0]$
  - $S = \{1, 2\}$ , the array  $A = [1, 1]$
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