

CAPTCHAs

Due to high demand, Google has developed a new type of CAPTCHA that detects if a person is a human or not by how they answer a very particular question involving graphs:

- Let G be a tree of N vertices rooted at the number 1 that defines our CAPTCHA.
- Let the function $A(u, v)$ denote the last node that you will cross in both paths leading from 1 to u and from 1 to v for any two nodes u, v of the tree G .
- Finally, let any labeling of this tree be a mapping $L(i)$ that assigns each integer between 1 and N a unique integer (called a label) also between 1 and N .

A labeling solves the CAPTCHA defined by G if and only if it maximizes the amount of pairs (i, j) such that the label of $A(i, j)$ is greater than the label of i and smaller than the label of j , so $L(i) < L(A(i, j)) < L(j)$ ($1 < i, j < N$).

You are tasked with helping people solve CAPTCHAs by finding an efficient algorithm to generate labelings for any given tree G .

Constraints

- $2 \leq N \leq 2 \times 10^3$

I/O

Let $G[i]$ be the parent of the i th node, and $L[i]$ the label associated to the i th node in any solving CAPTCHA.

Input

```
N  
G[2] G[3] ... G[N]
```

Output

```
L[1] L[2] ... L[N]
```

Subtasks

The final grade for this task will be the given by the sum of points of all subtasks that have passed in at least one of your submissions.

Test group	Points	Constraints
1	8	G is a binary tree (every node has at most 2 children)
2	17	Each node has at most 10 children
3	16	G is a snowflake: For any two nodes having equal distance to the root, they have the same number of children.
4	20	$N \leq 80$
5	39	No additional constraints

Examples

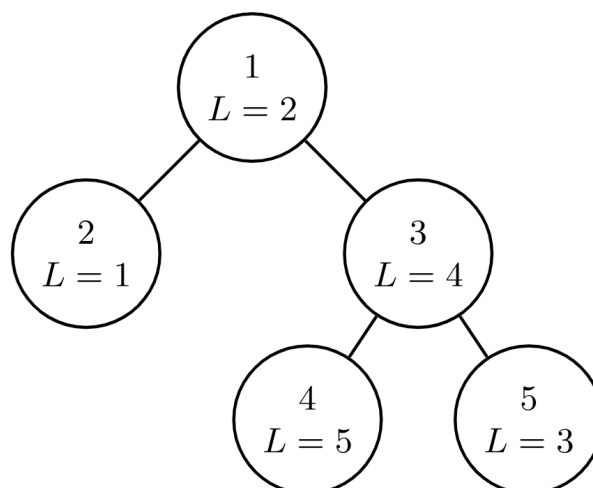
Example 1

Input :

```
5
1 1 3 3
```

Output :

```
2 1 4 5 3
```



Example 2

Input :

6
1 2 2 1 5

Output :

3 5 6 4 1 2

