

Graphs - Complete Notebook

codes, explanation, notes,
implementation, algorithms and
questions from leetcode and codeforces.

By Master The Codes

B. Badge

time limit per test: 1 second

memory limit per test: 256 megabytes

In Summer Informatics School, if a student doesn't behave well, teachers make a hole in his badge. And today one of the teachers caught a group of n students doing yet another trick.

Let's assume that all these students are numbered from 1 to n . The teacher came to student a and put a hole in his badge. The student, however, claimed that the main culprit is some other student p_a .

$a \rightarrow p_a \rightarrow p_{p_a} \rightarrow p_{p_{p_a}} \rightarrow \dots \xrightarrow{k \text{ times}}$

After that, the teacher came to student p_a and made a hole in his badge as well. The student in reply said that the main culprit was student p_{p_a} .

This process went on for a while, but, since the number of students was finite, eventually the teacher came to the student, who already had a hole in his badge.

After that, the teacher put a second hole in the student's badge and decided that he is done with this process, and went to the sauna.

You don't know the first student who was caught by the teacher. However, you know all the numbers p_i . Your task is to find out for every student a , who would be the student with two holes in the badge if the first caught student was a .

Input

The first line of the input contains the only integer n ($1 \leq n \leq 1000$) — the number of the naughty students.

The second line contains n integers p_1, \dots, p_n ($1 \leq p_i \leq n$), where p_i indicates the student who was reported to the teacher by student i .

Output

For every student a from 1 to n print which student would receive two holes in the badge, if a was the first student caught by the teacher.

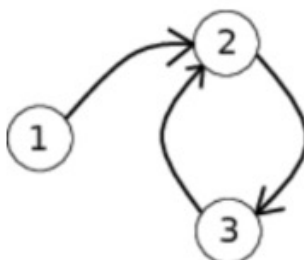
Examples

input	Copy
3 2 3 2	
output	Copy
2 2 3	

input	Copy
3 1 2 3	
output	Copy
1 2 3	

Note

The picture corresponds to the first example test case.



When $a = 1$, the teacher comes to students 1, 2, 3, 2, in this order, and the student 2 is the one who receives a second hole in his badge.

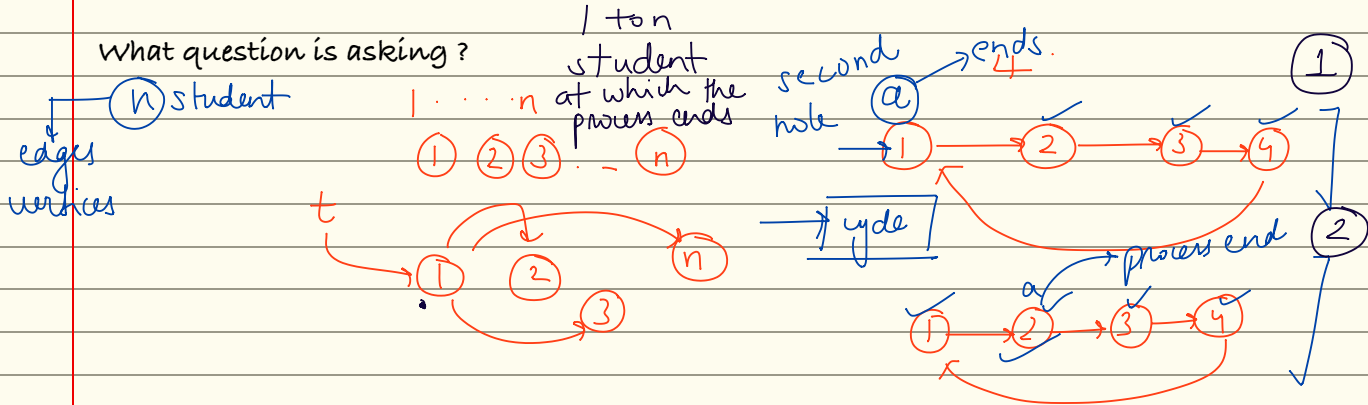
When $a = 2$, the teacher comes to students 2, 3, 2, and the student 2 gets a second hole in his badge. When $a = 3$, the teacher will visit students 3, 2, 3 with student 3

Graphs

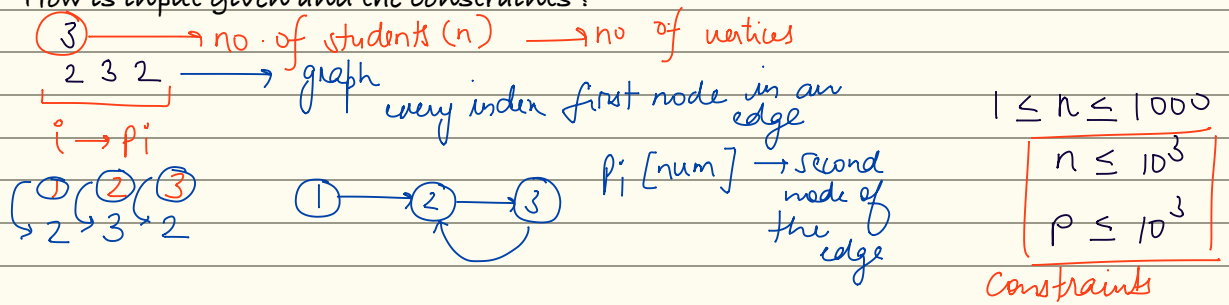
Code forces

Q1. Badge

Topics Covered - Adjacency List, DFS, BFS, Bipartite graphs



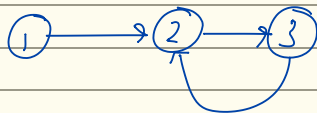
How is input given and the constraints?



How to develop the intuitions by asking questions?

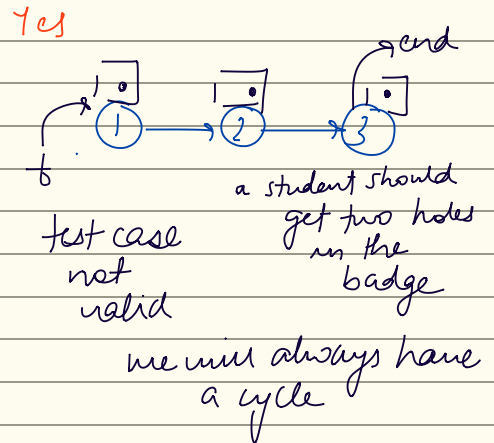
1. What is the type of graph? Will it contain a cycle?

3
2 3 2

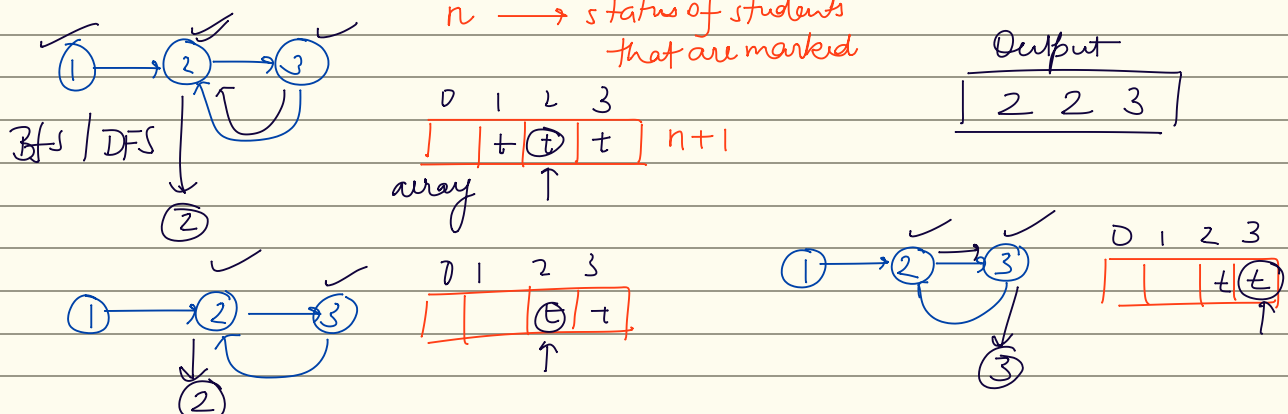


from ① → ②

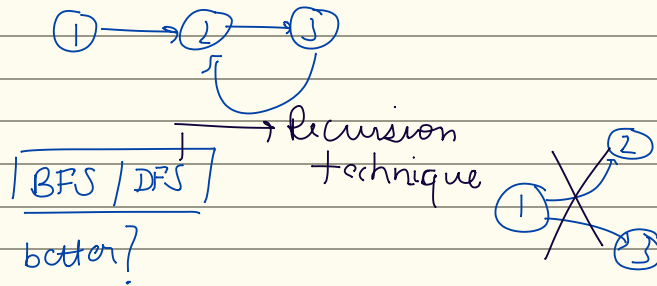
① ← ②



2. How will the brute force approach work?



3. Since I am traversing which algorithm will work?



4. Can I perform any further optimization?

