Problem E. Planets Cycles

Time limit 1000 ms
Mem limit 524288 kB

You are playing a game consisting of n planets. Each planet has a teleporter to another planet (or the planet itself).

You start on a planet and then travel through teleporters until you reach a planet that you have already visited before.

Your task is to calculate for each planet the number of teleportations there would be if you started on that planet.

Input

The first input line has an integer n: the number of planets. The planets are numbered $1, 2, \ldots, n$.

The second line has n integers $t_1, t_2, \ldots, t_n$: for each planet, the destination of the teleporter. It is possible that $t_i = i$.

Output

Print n integers according to the problem statement.

Constraints

- $1 \leq n \leq 2 \cdot 10^5$
- $1 \leq t_i \leq n$

Sample

Input	Output
5 2 4 3 1 4	3 3 1 3 4