Problem F. Friend From E-145

An alien species exist on Earth E-145. Squanchy who lives on Earth E-139 has a friend in E-145 named Quanchy. They communicate with each other through p-mail (portal mail).

They have started to write p-mail to each other recently. But there's a problem with the p-mail system. When Quanchy sends a p-mail, Squanchy receives a different one. Since the E-139ers are gifted with big brains, Squanchy has found out that the received p-mail is LPS of the sent one.

The p-mail sent by Quanchy is a string S. LPS of S is an array with the same length as S, which is defined as the longest prefix of $S_1, S_2, ..., S_i$ with the length smaller than i which is also a suffix of $S_1, S_2, ..., S_i$.

As you may know, the E-145 communication language alphabet consists of 1000 characters.

Squanchy wants to find a string which its LPS equals the received p-mail. He hopes the found string equals Quanchy's words. Help him take a chance.

Input

The first line includes one integer n, the length of the string S.

$$1 \leq n \leq 5 \times 10^5$$

The second line contains n integers LPS_i.

$$0 \leq LPS_i \leq 5 \times 10^5$$

Output

Output S, Squanchy's chance to understand Quanchy's words ($1 \leq S_i \leq 1\,000$). It is guaranteed that the answer exists. If there are multiple answers, print any.

Examples

test	answer
1 0	1
18 0 1 0 1 2 3 0 1 0 1 0 0 0 1 0 1 0 1	1 1 2 1 1 2 2 1 2 1 2 2 2 1 2 1 2 1