Pan African Olympiad in Informatics Team Selection Test 2025

Nelward the Sorting Robot

Time limit: 2 seconds **Memory limit: 512 MB**

Nelward is a sorting robot: as his name implies, his job is to sort rows of numbers, usually to visualize sorting algorithms. Today, he was given N bowling balls ($1 \leq N \leq 100$) each numbered $1, 2, ..., N$, and was asked to sort them by taking any ball and moving it k spaces ahead ($1 \leq k < N$). The next k balls will all move back one step to leave space for this one to be placed. Nelward is a short sighted sorting robot, which means he can only see the ball in front of him, and, since he was placed at the edge of the sorting platform, that ball will always be the first number on the list.

For example, suppose we have $N = 4$ and the balls are ordered like so: [4, 3, 2, 1], Nelward can only move ball 4. If he decides to move it $k = 2$ spaces ahead, the order will be [3, 2, 4, 1], and he can now only move ball 3, until he reassigns its position, at which point he can only move the next ball in line, and so on.

Nelward always knows the initial order of the bowling balls; help him devise a strategy to sort the balls by determining the minimum amount of operations he needs to do so as efficiently as possible.

Problem Description

You are given an array P of N distinct integers from 1 to N. Find the minimum amount of operations (denoted by C) needed to sort P, where an operation consists of placing the element $P[0]$ in front of the next k elements, for any $1 \leq k < N$.

Input

Input is formatted as follows:

```
N
P[0] P[1] P[2] ...  P[N-1]
```

Output

Output is expected as follows:

```
C
```

Constraints

- $1 \leq N \leq 100$
- $1 \leq P[i] \leq N$ $(0 \leq i < N)$

Subtasks

For this task, the amount of points you are awarded is the maximum of the percentages of testcases correctly answered across all of your submissions. This means that if this task has t testcases and you have answered at most s $(s \leq t)$ testcases correctly across all of your submissions, the amount of points you are awarded will be $100 * \frac{s}{t}$.

Example

```
4
1 2 4 3
```

Output:

```
3
```

Explanation

In this testcase, the minimum amount of moves needed is 3 operations: Nelward can move ball 1 by 2 positions (resulting in $[2, 4, 1, 3]$), then ball 2 by 2 positions (resulting in $[4, 1, 2, 3]$), and finally ball 4 by 3 positions (resulting in $[1, 2, 3, 4]$).