Increasing Swaps

Input file:	`standard input`
Output file:	`standard output`
Time limit:	2 seconds
Memory limit:	1024 megabytes

You are given a permutation $P = (P_1, P_2, \ldots, P_N)$ of $(1, 2, \ldots, N)$.

For a sequence of positive integers $T = (T_1, T_2, \ldots, T_{N-1})$ of length $N - 1$, the value $f(T)$ is defined as the return value of the following procedure.

Procedure $f(T)$

1. $t \leftarrow 0$.
2. While P is not sorted in ascending order:
   (a) $t \leftarrow t + 1$.
   (b) Let $S = (s_1, s_2, \ldots, s_k)$ be the sequence of all indices $i \in \{1, \ldots, N-1\}$ such that $T_i \leq t$, sorted in increasing order ($s_1 < s_2 < \cdots < s_k$).
   (c) For $j = 1$ to k:
      - Let $i \leftarrow s_j$. Then swap P_i and P_{i+1}.
   (d) If $t \geq 10^{100}$, return 10^{100}.
3. Return t.

Find the minimum possible value of $f(T)$ over all sequences T of positive integers. It is guaranteed that there exists a sequence T such that $f(T) < 10^{100}$.

Input

The input is given in the following format:

N
$P_1\ P_2\ \cdots\ P_N$

- All input values are integers.
- $2 \leq N \leq 5000$.
- $1 \leq P_i \leq N$.
- $P_i \neq P_j$ for $i \neq j$.

Output

Output the answer.

Examples

standard input	standard output
4 4 2 1 3	2
20 15 13 7 3 4 8 16 12 2 5 1 17 11 18 9 19 20 10 6 14	39

Note

In the first example, let $T = (2, 1, 2)$. At $t = 1$, with $S = (2)$, P becomes $(4, 1, 2, 3)$. At $t = 2$, with $S = (1, 2, 3)$, sequential swaps change P as $(4, 1, 2, 3) \to (1, 4, 2, 3) \to (1, 2, 4, 3) \to (1, 2, 3, 4)$. Thus $f(T) = 2$. Since no T yields $f(T) < 2$, the answer is 2.