E. Inversions After Shuffle

time limit per test: 1 second
memory limit per test: 256 megabytes
input: standard input
output: standard output

You are given a permutation of integers from 1 to n. Exactly once you apply the following operation to this permutation: pick a random segment and shuffle its elements. Formally:

1. Pick a random segment (continuous subsequence) from l to r. All segments are equiprobable.
2. Let $k = r - l + 1$, i.e. the length of the chosen segment. Pick a random permutation of integers from 1 to k, $p_1, p_2, \ldots, p_k$. All $k!$ permutation are equiprobable.
3. This permutation is applied to elements of the chosen segment, i.e. permutation $a_1, a_2, \ldots, a_{l-1}, a_l, a_{l+1}, \ldots, a_{r-1}, a_r, a_{r+1}, \ldots, a_n$ is transformed to $a_1, a_2, \ldots, a_{l-1}, a_{l-1+p_1}, a_{l-1+p_2}, \ldots, a_{l-1+p_{k-1}}, a_{l-1+p_k}, a_{r+1}, \ldots, a_n$.

Inversion if a pair of elements (not necessary neighbouring) with the wrong relative order. In other words, the number of inversion is equal to the number of pairs (i, j) such that $i < j$ and $a_i > a_j$. Find the expected number of inversions after we apply exactly one operation mentioned above.

Input

The first line contains a single integer n $(1 \le n \le 100\,000)$ — the length of the permutation.

The second line contains n distinct integers from 1 to n — elements of the permutation.

Output

Print one real value — the expected number of inversions. Your answer will be considered correct if its absolute or relative error does not exceed 10^{-9}.

Namely: let's assume that your answer is a, and the answer of the jury is b. The checker program will consider your answer correct, if .

Example

input
3 2 3 1
output
1.916666666666666666666666666667