Problem C. Charisma and Skill

Input file:	stdin
Output file:	stdout
Time limit:	1 second
Memory limit:	256 megabytes

Pavel Petrovich works as a coach in a ping-pong club in the "Rodina" palace of culture.

There are two brothers in the club: Artyom and Rodion Podavalov. Artyom trains a lot, and even though he could lose to anyone in the town in his first days, now he is the best and can beat everyone.

His brother Rodion had an advanced skill before, but his addiction to ACM contests prevailed over his aspiration for ping-pong and now he just spends all his free time at the university. So his sport abilities remain on the same level now.

But Artyom doesn't want to play in pair with anybody other than Rodion, in spite of talks that Rodion is spoiling his play. Artyom believes in numbers, so Pavel Petrovich has decided to use help of his friend Apollon Vladimirovich from the Polytechnic College to convince Artyom of bad influence of his partner. Apollon accepted the task with due responsibility and proposed a stochastic model. He proposed to measure the value of the ping-pong skill as a probability $0 \le p \le 1$ of victory over a random opponent.

The probability of victory for a pair also depends on the charisma relation of the players (second player over the first) $0 \le \alpha \le 1$ and equals $q = p_1 \cdot (1 - \alpha) + p_2 \cdot \alpha$, where p_1 and p_2 are the skill levels of the first and the second player — Artyom and Rodion respectively. Apollon suggested that the level of Artyom's skill in the first game was 0, in the last game it became 1, and it didn't decrease through the games. Rodion's skill as well as his relative charisma was constant.

Given the record of victories and defeats in a pair of these two players, you have to find these constant values using maximum likelihood estimation. More formally, you have to find values p_2 and α so that there exists a non-decreasing sequence of values of Artyom's skill starting from 0 and ending in 1, such that the product $P_1 \cdot P_2 \cdots P_N$ is maximized, where P_i is the probability of known outcome of i-th game. The product is maximized out of all possible values of $0 \le p_2, \alpha \le 1$ and all possible non-decreasing sequences of N values of Artyom's skill such that their first element is 0 and their last (N-th) element is 1.

Input

The first line of input contains one integer N: the number of games in the record ($2 \le N \le 10^6$). The second line contains N integers representing the outcomes of games: if i-th game has been lost, i-th number in the sequence is 0, otherwise it is 1.

Output

You have to output two numbers with absolute or relative precision 10^{-9}: the level of Rodion's skill and his relative charisma. If some of these numbers can not be uniquely determined, output -1 instead of such number.

Examples

stdin	stdout
3 1 0 0	0.3333333333 1.0000000000
7 1 0 1 0 1 1 0	0.6000000000 0.8333333333
2 0 1	-1 0