Problem J. Joy

Input file:	*standard input*
Output file:	*standard output*
Time limit:	2 seconds
Memory limit:	512 mebibytes

Assuming that $n-1$ other people with skill levels $a_1, a_2, \ldots, a_{n-1}$ are standing in a queue prepared for a Rock Paper Scissors tournament and your own skill level is x, find the probability that you will win the tournament after inserting yourself into any of the n positions in the queue (before person 1, between people 1 and 2, ..., after person $n-1$):

- while the queue has at least two people, two people are popped from the front of the queue and play a match (if people with skill levels p and q play a match, the first one wins with probability $\frac{p}{p+q}$ and the second one wins with probability $\frac{q}{p+q}$, there are no draws);
- the winner of the match gets pushed to the back of the queue, while the loser is eliminated;
- the last person standing in the queue is declared the winner of the tournament.

Input

The first line contains two integers n and x ($2 \le n \le 4096$; $n = 2^k$ for an integer k; $1 \le x \le 10^4$).

The second line contains $n-1$ integers $a_1, a_2, \ldots, a_{n-1}$ ($1 \le a_i \le 10^4$). a_1 is the skill level of the person at the front of the queue, while a_{n-1} corresponds to the person at the back.

Output

For each of the n positions in the queue where you can insert yourself, from the front to the back, display the probability of winning the tournament.

Your answer will be considered correct if its absolute or relative error doesn't exceed 10^{-9}.

Examples

standard input	standard output
4 2 1 1 1	0.444444444444444 0.444444444444444 0.444444444444444 0.444444444444444
4 3 4 5 2	0.188265306122449 0.188265306122449 0.239285714285714 0.239285714285714
8 8 1 2 3 4 5 6 7	0.393768719371413 0.393768719371413 0.353382184051268 0.353382184051268 0.248207450668989 0.248207450668989 0.230924146560510 0.230924146560510

Note

In the first test case, you beat any opponent with probability $\frac{2}{3}$. To win the tournament, you need to beat two opponents, hence the answer is $\frac{4}{9}$ regardless of your initial position.