



Wheel of Fortune

Wheel of Fortune is a familiar game in the game show “Who wants to be a millionaire?”.

This game is played between 2 players as follows:

- There are N numbers from 1 to N in the wheel.
- The first player spins the wheel. If the wheel stops at number A , he will get A points.
- He can chose to stop here and get A points or he can spin one more time.
- If he chose to spin one more time, he lands on B , he will get:
 - $(A+B)$ points if $A+B \leq N$
 - $(A+B-N)$ points if $A+B > N$
- Then it's the second player's turn. He is allowed to spins the wheel once or twice like first player.
- After his turn, whoever has the higher score wins. If two players has the same score, we will start the whole process again.

You are given two arrays A and B , where A_i is the probability of the first player lands on i and B_i is the probability of the second player lands on i .

Your task is calculate the probability of the first player wins the game.

Input

The first line contains an integer N ($2 \leq N \leq 100$)

The second line contains N non-negative numbers A_1, A_2, \dots, A_N where $\sum_{i=1}^N A_i = 1$.

The third line contains N non-negative numbers B_1, B_2, \dots, B_N where $\sum_{i=1}^N B_i = 1$.

The input guarantees that the probability of infinite game equals 0.

Output

You should print the probability of the first player wins the game.

Your answer will be considered correct if the relative or absolute error is at most 10^{-6} .



Examples

Standard Input	Standard Output
3 1 0 0 0 0 1	0.0
3 0 0 1 1 0 0	1.0
2 0.5 0.5 0.5 0.5	0.5