Rings

Assignment 3
Computer Programming

Problem:
Bhagwat Ji loves his girlfriend Dhruvika very much. He wants to gift her a lot of rings. There are in total N jewellery stores, each of the which has A_i rings.
Each day he asks his girlfriend for a number between 1 to N. She randomly picks the number each time and he performs some operation accordingly.
For each operation, he goes to the store number which Dhruvika selected.
If there is no ring left in the store, he comes back empty handed, otherwise he buys a ring from the store and the number of rings for that store decreases by 1.
If he brings back a ring, he gifts it to her. Find the expected number of days in which Dhruvika would get all the rings.

Input
First line contains an integer N, number of Stores.
Second line would contain N space separated integers (A_i) representing the number of rings that i^{th} store has initially.

Output
Print the expected number of days to get all the rings. The output is considered correct when the relative difference is not greater than 10^{-6}.

Constraints
$1 <= N <= 300$
$1 <= A_i <= 3$

Sample Test Case

Input	Output
3 1 1 1	5.500000

Explanation

Expected number of days to get 1^{st} ring = 1.
After that, expected number of days to get 2^{nd} ring = 1.5
After that, expected number of days to get 3^{rd} ring = 3
So total expected days = 1 + 1.5 + 3 = 5.5

Sample Test Case

Input	Output
2 1 2	4.500000

Explanation

Expected number of days to get 1^{st} ring = 1.
Now it depends on whether he got the 1^{st} ring from the 1^{st} store or the 2^{nd} one.
If he got the 1^{st} ring from 1^{st} store, expected days to get 2^{nd} ring = 2 and expected days to get 3^{rd} ring = 2.
If he got the 1^{st} ring from 2^{nd} store, expected days to get 2^{nd} ring = 1 and expected days to get 3^{rd} ring = 2.
Note that both cases happen with equal probability as store number is picked randomly.
Expected days for 1^{st} case = 5
Expected days for 2^{nd} case = 4
So, expected days in total = (5 + 4) / 2 = 4.5 (As both cases have equal probability)

Sample Test Case

Input	Output
10 1 3 2 3 3 2 3 2 1 3	54.480644