I - Coins

Time Limit: 2 sec / Memory Limit: 1024 MB

Score : 100 points

Problem Statement

Let N be a positive odd number.

There are N coins, numbered $1, 2, \ldots, N$. For each i ($1 \leq i \leq N$), when Coin i is tossed, it comes up heads with probability p_i and tails with probability $1 - p_i$.

Taro has tossed all the N coins. Find the probability of having more heads than tails.

Constraints

- N is an odd number.
- $1 \leq N \leq 2999$
- p_i is a real number and has two decimal places.
- $0 < p_i < 1$

Input

Input is given from Standard Input in the following format:

$$N$$
$$p_1 \quad p_2 \quad \cdots \quad p_N$$

Output

Print the probability of having more heads than tails. The output is considered correct when the absolute error is not greater than 10^{-9}.

Sample Input 1 Copy

```
3
0.30 0.60 0.80
```

Copy

Sample Output 1 Copy

Copy

```
0.612
```

The probability of each case where we have more heads than tails is as follows:

- The probability of having $(\mathrm{Coin1}, \mathrm{Coin2}, \mathrm{Coin3}) = (\mathrm{Head}, \mathrm{Head}, \mathrm{Head})$ is $0.3 \times 0.6 \times 0.8 = 0.144$;
- The probability of having $(\mathrm{Coin1}, \mathrm{Coin2}, \mathrm{Coin3}) = (\mathrm{Tail}, \mathrm{Head}, \mathrm{Head})$ is $0.7 \times 0.6 \times 0.8 = 0.336$;
- The probability of having $(\mathrm{Coin1}, \mathrm{Coin2}, \mathrm{Coin3}) = (\mathrm{Head}, \mathrm{Tail}, \mathrm{Head})$ is $0.3 \times 0.4 \times 0.8 = 0.096$;
- The probability of having $(\mathrm{Coin1}, \mathrm{Coin2}, \mathrm{Coin3}) = (\mathrm{Head}, \mathrm{Head}, \mathrm{Tail})$ is $0.3 \times 0.6 \times 0.2 = 0.036$.

Thus, the probability of having more heads than tails is $0.144 + 0.336 + 0.096 + 0.036 = 0.612$.

Sample Input 2 Copy

```
1
0.50
```

Sample Output 2 Copy

```
0.5
```

Outputs such as `0.500`, `0.500000001` and `0.499999999` are also considered correct.

Sample Input 3 Copy

```
5
0.42 0.01 0.42 0.99 0.42
```

Sample Output 3 Copy

```
0.3821815872
```