Problem D
Drinking Culture

Filipinos love alcohol. Those planning an *inuman*[2] have a plethora of options to choose from while in the Philippines: from the traditional palm liquor *lambanog*, to the ubiquitous *San Miguel Pale Pilsen* beer, to the classic *Tanduay Rum*.

Did you know that the logo on the bottle of *Ginebra San Miguel* (a popular local gin) was a commission done in 1917 by painter *Fernando Amorsolo*, who would later go on to be recognized as the Philippines' first National Artist? Drinking is a part of Filipino culture!

Bob fancies himself a mixologist. He has a collection of n bottles of alcoholic beverages, labeled 1 to n. He knows that bottle i contains exactly v_i units of liquid (measured by volume), exactly a_i units of which are alcohol. Note that $0 \leq a_i \leq v_i$ always.

The *alcohol content* of a liquid is equal to what proportion of that liquid (by volume) is alcohol. The alcohol content of the liquid in bottle i is exactly a_i/v_i. The contents of each bottle are completely homogeneous, i.e. any amount of liquid taken from bottle i will maintain that same alcohol content of a_i/v_i.

To mix a drink, Bob selects any subset of the bottles in his collection and takes *any* amount of liquid from each of those bottles *(they do not have to be integer values)*. He combines those samples into one glass, and mixes until homogeneous.

Bob's friend, a statistician, who's had a long and grueling day at work, wants him to mix her a drink that will render her unconscious. She issues Bob the following challenge:

- She generates a *real number* s uniformly randomly from the interval $[0, V]$, where $V = \sum_{i=1}^{n} v_i$ is the total amount of liquid across all bottles in Bob's collection.
- She also generates a *real number* f uniformly randomly from the interval $[0, 1]$.
- Bob's task is to use his collection to mix her a drink, such that
  - the total volume of liquid in the drink is exactly s, and
  - the alcohol content of the drink is exactly f.

What is the probability that Bob can successfully complete this task?

Input Format

The first line of input contains a single integer n.

The second line of input contains the n space-separated integers $v_1, v_2, v_3, \ldots, v_n$.

The third line of input contains the n space-separated integers $a_1, a_2, a_3, \ldots, a_n$.

Output Format

Output a single decimal value between 0.0 and 1.0, the probability Bob can complete this task.

Your answer will be accepted if it has an absolute or relative error of at most 10^{-8} from the judge's answer. In symbols, let ans_{you} be your answer, and let ans_{judge} be the judge's answer. Your answer will be accepted if

$$|ans_{\text{you}} - ans_{\text{judge}}| \leq 10^{-8}$$

[2] TL note: a drinking session with friends

Constraints

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$2 \leq n \leq 2 \times 10^5$ $1 \leq v_i \leq 10^9$ and $0 \leq a_i \leq v_i$ for each i

Sample I/O

Input	Output
3 350 750 330 140 131 16	0.19356182654786474591

Explanation

Let's consider two concrete examples. Here, $V = 350 + 750 + 330 = 1430$.

Suppose $s = 500$ and $f = 3/13$. Then, the answer is yes! Bob could (for example) mix $97750/377$ units of the drink in bottle 1, and $90750/377$ units of the drink in bottle 3. The total amount of liquid in the mix would be

$$97750/377 + 90750/377 = 188500/377 = 500,$$

and the alcohol content would be

$$\frac{(97750/377)\frac{140}{350} + (90750/377)\frac{16}{330}}{500} = \frac{3}{13}.$$

However, suppose $s = 814$ and $f = 0.1234567$. Then unfortunately, the answer is no. It can be shown that such a drink cannot be mixed using Bob's collection of alcohol.

When considering the distribution of all possible pairs of values for s and f, the probability that the drink can be mixed is $\approx 0.19356182654786474591$.