Old cassette player (3) P37067_en

Consider an old cassette player, whose only working buttons are "play" and "rewind". You have just one cassette, which you always keep completely rewinded. So, when you want to listen to a particular song s, you have to press the "play" button and wait until all the songs stored before s finish. Afterwards, when s ends, you always rewind the cassette.

You have n songs. You know that you want to listen to song i with absolute frequency f_i. (For instance, if $f_1 = 6$ and $f_2 = 3$, then you listen to song 1 twice as much as to song 2.) You also know the duration d_i of every song i. Assume that the cassette is long enough to store all your songs. Your goal is to choose the order to store the songs so as to minimize the expected time to listen to a desired song.

Input

Input is all natural numbers, and consists of several cases. Every case begins with n, which is followed by n pairs $f_i\ d_i$. At least one of the frequencies is strictly positive. All the durations are strictly positive. Assume $1 \leq n \leq 10^5$.

Output

For every case, print with four digits after the decimal point the optimal expected time to listen to a desired song. The input cases have no precision issues.

Sample input 1

```
2    6 1   6 1
2    6 1   3 1
2    6 3   6 1
2    6 3   3 1
4    3 9   0 8   1 4   4 7
1    8 100
```

Sample output 1

```
1.5000
1.3333
2.5000
3.0000
12.0000
100.0000
```

Problem information

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