Problem G.
Minimum Shipping Cost

Time limit: 2 seconds

Pigou works at Inter-Continental Prado Cargo (ICPC) as a manager to arrange the shipping business of cargos. To model the problem, Pigou begins with a simple example as in Figure 1. There are two arcs a_1 and a_2 indicating there are two methods to ship cargo from the origin O to the destination D, however, these two ways of shipping might lead to different costs.

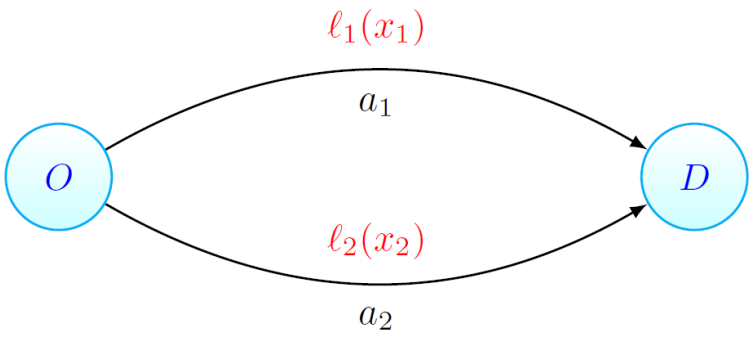


Figure 1: A simple example.

Define the cost of the shipping methods by cost functions: if a fraction x_1 of the cargos use arc a_1, then $\ell_1(x_1)$ represents the cost of the cargo to reach the destination; similarly, if a fraction x_2 of the cargos use the alternative arc a_2, then $\ell_2(x_2)$ represents the incurred cost. Naturally, the higher the fraction, the higher the cost. So assume that $\ell_1(x_1)$ and $\ell_2(x_2)$ are non-decreasing with respect to x_1 and x_2, respectively.

An efficient use of the methods means to minimize the total cost, which in this case can be expressed as the minimization of $x_1\ell_1(x_1) + x_2\ell_2(x_2)$, where x_1 is the fraction of cargos that use a_1, and x_2 is the fraction of cargos that use a_2; as they are fractions, we may impose that $x_1 + x_2 = 1$ and $x_1, x_2 \geq 0$. For example, take $\ell_1(x_1) = x_1$ and $\ell_2(x_2) = 1$. In this way, we get $x_1 = 0.5$ and $x_2 = 0.5$, and 0.75 is the minimum cost for this example. This is the so called *optimum*.

Indeed, Pigou considers a more general situation, where there are N different ways (arcs) for shipping: $a_1, \ldots, a_N$ and for $i = 1..N$, a_i has $\ell_i(x)$ as its cost function. Suppose the total cargo to be shipped is 1 and x_i indicates the fraction assigned to arc a_i, for $i = 1..N$. Note that $x_1 + \cdots + x_N = 1$. Pigou further restricts each $\ell_i(x)$ to the form $a_i x^{e_i}$, where a_i is a positive integer and e_i is a non-negative integer. He wants to know how to arrange the x_i's such that $\sum_{i=1}^{N} x_i \ell_i(x_i)$ is minimum.

Given the cost functions, your task is to write a program to help Pigou find the minimum cost.

Input

The first line contains an integer T indicating the number of test cases.

Each case starts with a line of one positive integers, N, which indicate the number of arcs, respectively. Then N lines follow and each consists of two integers, $a > 0$ and $e \geq 0$ indicating that the corresponding cost function $\ell(x) = ax^e$.

- $1 \leq T \leq 10$
- $1 \leq N \leq 100$
- $1 \leq a_i \leq 1000; 0 \leq e_i \leq 5$, for $i = 1, \ldots, N$

Output

For each test case, output one line containing the minimum value of $\sum_{i=1}^{N} x_i \ell(x_i)$. The precision of the answer is 6 places after decimal point without rounding. The error can be at most 10^{-6}.

Sample Input	Sample Output
2 2 1 1 1 0 3 1 2 1 0 2 0	0.750000 0.615100

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