Problem (BonusB) Maximum Density Segment

Consider the following problem:

Given a sequence of n integer pairs $(a_1, b_1), (a_2, b_2), \ldots, (a_n, b_n)$, where $b_i > 0$, and a target lower-bound $L > 0$, compute the best segment (ℓ, r) of the sequence, where $1 \le \ell \le r \le n$, such that

1. $\sum_{\ell \le i \le r} b_i \ge L$, and
2. the density of the segment, defined as

$$\left(\sum_{\ell \le i \le r} a_i \right) / \left(\sum_{\ell \le i \le r} b_i \right) \quad = \quad \frac{a_\ell + a_{\ell+1} + \ldots + a_r}{b_\ell + b_{\ell+1} + \ldots + b_r} \quad ,$$

   is maximized among all possible segments satisfying Condition 1.

In other words, we want to compute a segment (ℓ, r) satisfying Condition 1 such that, for any segment (ℓ', r') that also satisfies Condition 1, we always have

$$\left(\sum_{\ell \le i \le r} a_i \right) / \left(\sum_{\ell \le i \le r} b_i \right) \quad \ge \quad \left(\sum_{\ell' \le i \le r'} a_i \right) / \left(\sum_{\ell' \le i \le r'} b_i \right) .$$

To solve this problem efficiently (yet approximately), You may want to use the property given at the end of this problem description. It may also be helpful to use the solutions of W7-1, W7-2, and W3-2 as building blocks for this problem.

Input

The first line contains two integers n and L, $(2 \le n \le 10^5)$, the length of the sequence and the target lower-bound.

Each of the next n lines contain two integers, a_i and b_i, where $b_i > 0$ is strictly positive.

Output

Print a double-precision floating-point number, the maximum density that can be achieved, in the first line. In the second line, print the end points, ℓ and r, of the segment that achieves this density.

If there are multiple answers, print any of them.

Note that, the relative error between the density you output and the optimal density should be no more than 10^{-6}, and the end points ℓ and r must satisfy $\ell < r$.

Problem 1 continued on next page. . .

Example 1

Input	Output
8 5 3 1 7 2 5 1 4 2 5 1 17 6 16 4 4 2	3.5 2 5

Note

You may want to use the following property.

Lemma 1. Let α^* denote the optimal density that can be achieved by any segment of length at least two. Let $\alpha \in \mathbb{R}$ be an arbitrary real number.

Define a sequence $\mathtt{C} = \{ c_1, c_2, \ldots, c_n \}$, where $c_i := a_i - \alpha \cdot b_i$.

Let S be the segment with maximum sum (with respect to C) among all segments satisfying Condition 1, i.e., all segments with $\sum b_i \geq L$. Then

$$\begin{cases} \mathtt{S} > 0 \\ \mathtt{S} = 0 \\ \mathtt{S} < 0 \end{cases} \iff \begin{cases} \alpha < \alpha^* \\ \alpha = \alpha^* \\ \alpha > \alpha^* \end{cases}$$

In other words, by inspecting the value of S, you know the relative order of your guess α and the optimal value α^*.