

## Problem L

### Grief

Time limit: 1s  
Memory limit: 256MB

Congrats Doggie!

— Demen

Doggie works with liquid mixtures of **Mercury (Hg)** and **Tacos (Ts)**. A mixture represented by  $(x, y)$  contains  $x$  grams of Hg and  $y$  grams of Ts.

Doggie has  $n$  available mixtures. He may also buy any finite number of new mixtures. Buying a mixture containing  $x$  grams of Hg and  $y$  grams of Ts costs  $ax + by$ , where  $x$  and  $y$  may be any nonnegative real numbers. In what follows, mixture  $i$  (existing or purchased) contains  $x_i$  grams of Hg and  $y_i$  grams of Ts.

To produce a mixture, Doggie takes an independent fraction  $p_i \in [0, 1]$  of each mixture he owns, existing and purchased alike. The fractions need not sum to 1. The result contains exactly  $\sum_i p_i x_i$  grams of Hg and  $\sum_i p_i y_i$  grams of Ts.

Doggie is considering  $m$  possible target mixtures for his experiment, but he has not decided which one to produce. During the later experiment phase, the shop will have no mixtures left, so he cannot buy any more. He wants to buy enough now to guarantee that he can produce whichever target he chooses later. He will produce only one target, and he may choose the fractions after deciding which target to produce. The result must contain **exactly** the target's amounts of Hg and Ts.

Help Doggie choose his purchases so that every possible target can be produced, while minimizing the total cost of the mixtures he buys.

### Input

- The first line contains four integers  $n, m, a,$  and  $b$  ( $1 \leq n, m \leq 436879$ ;  $1 \leq a, b \leq 396$ ).
- Each of the next  $n$  lines contains two integers  $x_i$  and  $y_i$  ( $0 \leq x_i, y_i \leq 436879$ ), the grams of Hg and Ts in an existing mixture.
- Each of the next  $m$  lines contains two integers  $X_j$  and  $Y_j$  ( $0 \leq X_j, Y_j \leq 436879$ ), the grams of Hg and Ts in a target mixture.

### Output

Print one real number: the minimum total cost of buying the new mixtures.

Your answer will be accepted if its absolute or relative error does not exceed  $10^{-6}$ . Formally, let your output be  $u$  and the jury's answer be  $v$ ; your output is accepted if and only if  $\frac{|u-v|}{\max(1, |v|)} \leq 10^{-6}$ .

| Sample Input                                                    | Sample Output    |
|-----------------------------------------------------------------|------------------|
| 5 2 1 1<br>1 2<br>3 4<br>5 6<br>7 8<br>9 10<br>80 80<br>100 100 | 145.000000000000 |
| 3 3 3 1<br>6 4<br>0 0<br>0 2<br>2 1<br>1 3<br>4 5               | 1.833333333333   |

## Notes

Together, the five available mixtures contain 25 grams of Hg and 30 grams of Ts. If Doggie later chooses the target containing 100 grams of each ingredient, he will need at least 75 more grams of Hg and 70 more grams of Ts. Thus, he must spend at least 145.

Doggie can buy one mixture containing exactly 75 grams of Hg and 70 grams of Ts. If he chooses the target containing 100 grams of each ingredient, he uses all six mixtures. If he chooses the target containing 80 grams of each ingredient, he uses 80% of each mixture. Therefore, the answer is 145.