

Similar statements (5)

P12471_en

Consider two infinite horizontal lines A and B , separated ℓ units apart. The line A has m points at the abscissae a_1, \dots, a_m . The line B has n points at the abscissae b_1, \dots, b_n . Given p different indices i_1, \dots, i_p chosen from $\{1 \dots m\}$, and p different indices j_1, \dots, j_p chosen from $\{1 \dots n\}$, define d_k as the Euclidean distance between a_{i_k} and b_{j_k} , that is,

$$d_k = \sqrt{(a_{i_k} - b_{j_k})^2 + \ell^2} .$$

You are given ℓ, p , and the points in A and in B . Pick i_1, \dots, i_p and j_1, \dots, j_p in order to

$$\text{minimize } \max_{k=1..p} d_k$$

Input

Input consists of several cases, each one with only integer numbers. Every case begins with four strictly positive numbers ℓ, p, m and n . Follow $a_1 \leq a_2 \leq \dots \leq a_{m-1} \leq a_m$. Follow $b_1 \leq b_2 \leq \dots \leq b_{n-1} \leq b_n$. Assume $\ell \leq 10^6, p \leq \min(m, n)$, and that the absolute value of each abscissa is at most 10^6 .

Additionally, assume that m and n are at most 10^4 .

Output

For every case, print the result with four digits after the decimal point. If you use the long double type, the input cases have no precision issues.

Sample input 1

```
1 1 2 2
5 10
9 20

1 2 2 2
5 10
9 20

1000000 4 5 4
300000 300000 300000 300000 300000
-500000 -500000 -500000 -500000

3 2 7 4
0 2 4 6 8 10 12
1 4 7 10
```

Sample output 1

```
1.4142
10.0499
1280624.8475
3.0000
```

Problem information

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