Similar statements (4) P73574_en

Catorzè Concurs de Programació de la UPC - Semifinal (2016-06-29)

Consider two infinite horizontal lines A and B, separated ℓ units apart. The line A has m points at the abscissae $a_1, \ldots, a_m$. The line B has n points at the abscissae $b_1, \ldots, b_n$. Given p different indices $i_1, \ldots, i_p$ choosen from $\{1 \ldots m\}$, and p different indices $j_1, \ldots, j_p$ choosen from $\{1 \ldots n\}$, 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 $i_1, \ldots, i_p$ and $j_1, \ldots, j_p$ in order to

$$\textbf{maximize} \quad \min_{k=1..p} \ d_k$$

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 $a_1 \leq a_2 \leq \cdots \leq a_{m-1} \leq a_m$. Follow $b_1 \leq b_2 \leq \cdots \leq b_{n-1} \leq b_n$. 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 1000.

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 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

```
15.0333
4.1231
1280624.8475
10.4403
```

Problem information

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