Distance to the nearest point   P28079_en
Onzè Concurs de Programació de la UPC - Semifinal (2013-06-19)

Given two sets *S* and *Q* of points on the plane, determine, for each point in *Q*, the minimum of the Manhattan distances to the points in *S*.

Input

Input consists of a natural *n*, the coordinates of the *n* points in *S*, a natural *m*, and the coordinates of the *m* points in *Q*. Assume $1 \leq n \leq 10^5$ and $0 \leq m \leq 10^5$. The coordinates are real numbers. Points can be repeated.

Output

For every point in *Q*, print the Manhattan distance to its closest point in *S*.

Observation

This problem tolerates an error of 10^{-7} for each output.

Sample input 1

```
5
    0 0
    0 1
    1 0
    1 1
    1 0
3
    0.1 0.1
    0.5 0.5
    1.0 1.0
```

Sample output 1

```
0.20000000
1.00000000
0.00000000
```

Sample input 2

```
3
    2057.54368732 7224.84142068
    6754.64655994 7907.85575136
    9678.10748947 4968.45548394
4
    6628.69040481 8947.34821279
    747.4327363 8300.22431512
    8784.52986333 4373.37802232
    7170.45535426 6464.09159581
```

Sample output 2

```
1165.44861656
2385.49384546
1488.65508776
1859.57294987
```

Sample input 3

```
5
    0 0
    0 1
    1 0
    1 1
    1 0
3
```

```
    0.1 0.1
    0.5 0.5
    1.0 1.0
```

Sample output 3

```
0.20000000
```

```
1.00000000
0.00000000
```

Problem information

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