

Nearest Neighbor Search

You are given N ($N \leq 100\,000$) d -dimensional ($1 \leq d \leq 5$) points, each having integer coordinates (X_1, X_2, \dots, X_d) . Then Q ($Q \leq 100\,000$) queries follow. For each query you are given a d -dimensional point (not necessarily from the given N) and you are to find the squared Euclidean distance to the closest point from the given N .

The coordinates of all $N+Q$ points are generated randomly between $-1\,000\,000\,000$ and $1\,000\,000\,000$.

The squared Euclidean distance between two points A and B is the sum of $(A.X_i - B.X_i)^2$ for $i=1, 2, \dots, d$.

Input

The first line contains three numbers - N , d and Q .

The next N lines contain d integers each - the coordinates of a point.

The next Q lines contain d integers each - the coordinates of a query point.

Output

Print the answer for each of the Q queries on separate lines.

Example

Input:

```
2 2 2
1 1
2 2
1 1
3 3
```

Output:

```
0
2
```