



Find the Path

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Problem

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You are given a table, a , with n rows and m columns. The top-left corner of the table has coordinates $(0, 0)$, and the bottom-right corner has coordinates $(n - 1, m - 1)$. The i^{th} cell contains integer $a_{i,j}$.

A path in the table is a sequence of cells $(r_1, c_1), (r_2, c_2), \dots, (r_k, c_k)$ such that for each $i \in \{1, \dots, k - 1\}$, cell (r_i, c_i) and cell (r_{i+1}, c_{i+1}) share a side.

The weight of the path $(r_1, c_1), (r_2, c_2), \dots, (r_k, c_k)$ is defined by $\sum_{i=1}^k a_{r_i, c_i}$ where a_{r_i, c_i} is the weight of the cell (r_i, c_i) .

You must answer q queries. In each query, you are given the coordinates of two cells, (r_1, c_1) and (r_2, c_2) . You must find and print the minimum possible weight of a path connecting them.

Note: A cell can share sides with at most 4 other cells. A cell with coordinates (r, c) shares sides with $(r - 1, c)$, $(r + 1, c)$, $(r, c - 1)$ and $(r, c + 1)$.

Input Format

The first line contains 2 space-separated integers, n (the number of rows in a) and m (the number of columns in a), respectively.

Each of n subsequent lines contains m space-separated integers. The j^{th} integer in the i^{th} line denotes the value of $a_{i,j}$.

The next line contains a single integer, q , denoting the number of queries.

Each of the q subsequent lines describes a query in the form of 4 space-separated integers: r_1 , c_1 , r_2 , and c_2 , respectively.

Constraints

- $1 \leq n \leq 7$
- $1 \leq m \leq 5 \times 10^3$
- $0 \leq a_{i,j} \leq 3 \times 10^3$
- $1 \leq q \leq 3 \times 10^4$

For each query:

- $0 \leq r_1, r_2 < n$
- $0 \leq c_1, c_2 < m$

Output Format

On a new line for each query, print a single integer denoting the minimum possible weight of a path between (r_1, c_1) and (r_2, c_2) .

Sample Input

```
3 5
0 0 0 0 0
1 9 9 9 1
0 0 0 0 0
3
0 0 2 4
0 3 2 3
1 1 1 3
```

Sample Output

```
1
1
18
```

Explanation

The input table looks like this:

(0,0)

0	0	0	0	0
1	9	9	9	1
0	0	0	0	0

(2,4)

The first two queries are explained below:

1. In the first query, we have to find the minimum possible weight of a path connecting (0,0) and (2,4). Here is one possible path:

(0,0)

0	0	0	0	0
1	9	9	9	1
0	0	0	0	0

(2,4)

The total weight of the path is $0 + 1 + 0 + 0 + 0 + 0 + 0 = 1$.

2. In the second query, we have to find the minimum possible weight of a path connecting (0,3) and (2,3). Here is one possible path:

(0,0) (0,3)

0	0	0	0	0
1	9	9	9	1
0	0	0	0	0

(2,3) (2,4)

The total weight of the path is $0 + 0 + 1 + 0 + 0 = 1$.

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Submissions: 215


Max Score: 75

Difficulty: Hard

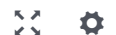
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Java 7



```
1 import java.io.*;
2 import java.util.*;
3 import java.text.*;
4 import java.math.*;
5 import java.util.regex.*;
```

```
6
7 public class Solution {
8
9     public static void main(String[] args) {
10         /* Enter your code here. Read input from STDIN. Print output to STDOUT. Your class should be named Solution. */
11     }
12 }
13
```

Line: 1 Col: 1

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