

Huarongdao is a well-known game in China. The purpose of this game is to move the Cao Cao block out of the board.

Acme is interested in this game, and he invents a similar game. There is a $N \times M$ board. Some blocks in this board are movable, while some are fixed. There is only one empty position. In one step, you can move a block to the empty position, and it will take you one second. The purpose of this game is to move the Cao Cao block to a given position. Acme wants to finish the game as fast as possible.

But he finds it hard, so he cheats sometimes. When he cheats, he spends K seconds to pick a block and put it in an empty position. However, he is not allowed to pick the Cao Cao block out of the board.

Note

1. Immovable blocks cannot be moved while cheating.
2. A block can be moved only in the directions UP, DOWN, LEFT or RIGHT.

Input Format

The first line contains four integers N, M, K, Q separated by a single space. N lines follow. Each line contains M integers 0 or 1 separated by a single space. If the j_{th} integer is 1, then the block in i_{th} row and j_{th} column is movable. If the j_{th} integer is 0 then the block in i_{th} row and j_{th} column is fixed. Then Q lines follow, each line contains six integers $EX_i, EY_i, SX_i, SY_i, TX_i, TY_i$ separated by a single space. The i_{th} query is the Cao Cao block is in row SX_i column SY_i , the exit is in TX_i, TY_i , and the empty position is in row EX_i column EY_i . It is guaranteed that the blocks in these positions are movable. Find the minimum seconds Acme needs to finish the game. If it is impossible to finish the game, you should answer -1.

Constraints

$N, M \leq 200$
 $1 \leq Q \leq 250$
 $10 \leq K \leq 15$
 $1 \leq EX_i, SX_i, TX_i \leq N$
 $1 \leq EY_i, SY_i, TY_i \leq M$

Output Format

You should output Q lines, i -th line contains an integer which is the answer to i -th query.

Sample Input

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5 5 12 1
1 1 1 1 1
1 1 1 1 1
0 1 1 1 1
1 1 1 1 1
0 1 0 1 1
1 5 4 3 4 1
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Sample Output

20

Explanation

Move the block in (1, 4) to (1, 5);
Move the block in (1, 3) to (1, 4);
Move the block in (1, 2) to (1, 3);
Move the block in (2, 2) to (1, 2);
Move the block in (3, 2) to (2, 2);
Move the block in (4, 2) to (3, 2);
Move the block in (4, 3) to (4, 2);
Move the block in (4, 1) to (4, 3) by cheating;
Move the block in (4, 2) to (4, 1).

So, $1 + 1 + 1 + 1 + 1 + 1 + 1 + 12 + 1 = 20$.

