Huarongdao

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*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 follows, 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.

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

Constraints

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

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

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20
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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.