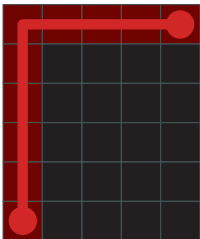




Your next task is to calculate the Manhattan distances of points.

Vocabulary

- Point: (p_i, c_i) , where p_i is the Position the of the point _{i} , and c_i represents the color of the point _{i}
 - The colors are represented by consecutive integers: 1,2,3,...
 - If the color i exists, then all colors j , where $1 \leq j < i$ also exist.
 - Each color appears exactly twice on the board.



Manhattan Distance:

Given two points (r_1, c_1) (r_2, c_2)

$$MD = \text{abs}(r_1 - r_2) + \text{abs}(c_1 - c_2)$$



Input

rows cols numberOfPoints Point₁ Point₂ ... Point_{numberOfPoints}

Output

$d_1 d_2 \dots d_n$

d_i means the Manhattan distance between the points with color i

Example input

number of points

6 5 8 1 4 5 2 7 3 12 4 17 3 19 1 24 1 26 2

size of board

color of point
point position

Example output

1 9 2 3

Manhattan distance of 3 between the two red points

