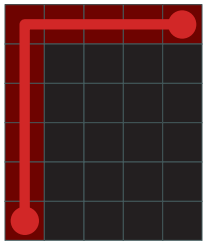

**Your next task is to calculate the Manhattan distances of points.**

## 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$_i$

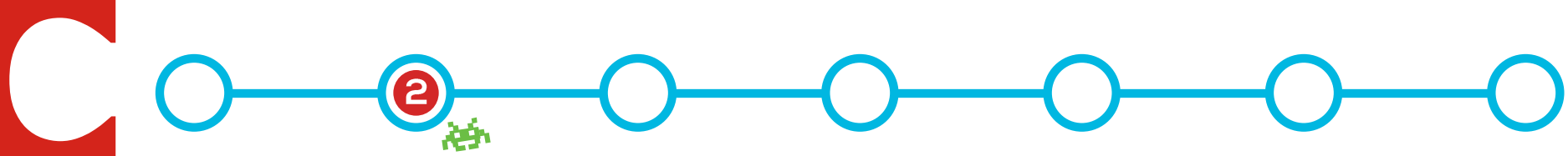
- The colors are represented by consecutive integers: 1,2,3,...
- If the color *i* exists, then all colors *j*, where *1<=j<i* also exist.
- Each color appears exactly twice on the board.



**Manhattan Distance:**

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

MD = abs($r_1$-$r_2$) + abs($c_1$-$c_2$)




## Input

rows cols numberOfPoints $Point_1$ $Point_2$ … $Point_{numberOfPoints}$

## Output

$d_1$ $d_2$ … $d_n$

$d_i$ means the Manhattan distance between the points with color *i*