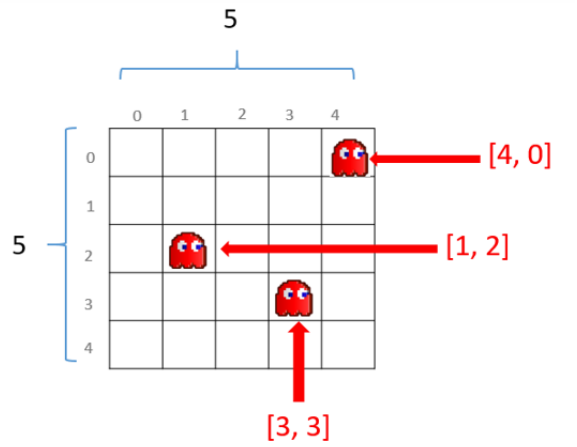
Question - 1

[ARRAY 2D] DISPLAY MONSTERS!



We want to display monsters within a grid of 5 X 5 cells:
- a monster has a position on X : from 0 to 4
- a monster has a position on Y : from 0 to 4

We represent a monster position using an array of 2 elements :
[position_X, position_Y]

- Enter a list of monsters position (array of array!)
  For instance, this list represent the monsters on above image :
  [[3, 3], [1, 2], [4, 0]]

- Print the grid of 5 X5 cells
  - Cell with no monster : -
  - Cell with monster: *

```
0 0 0 0 *
0 0 0 0 0
0 * 0 0 0
0 0 0 * 0
0 0 0 0 0
```

To perform this exercise you need to code this function and call it :

Function name	hasMonsterOnCell
Parameters	monsterPositions (array of array) : the positions of monsters cellX (integer) : the cell X position

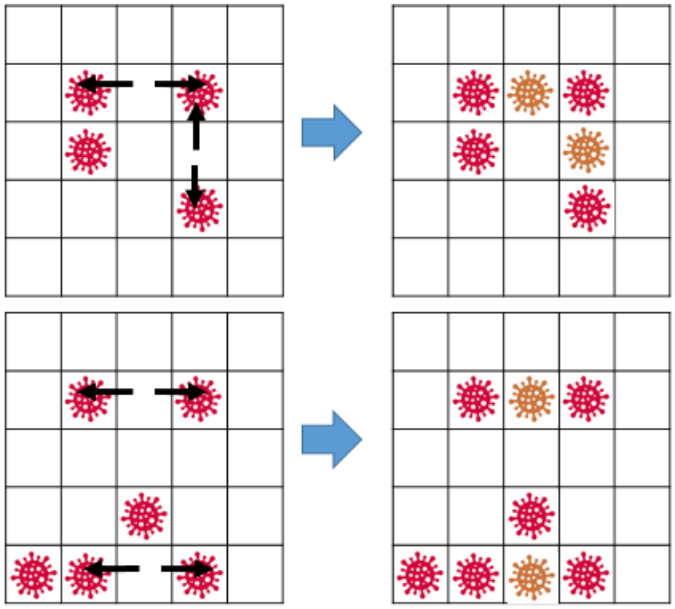
	cellY (integer) : the cell Y position
Return value	Return True if a monster is on given cell position, given the list of monster position Return False otherwise
Examples	hasMonsterOnCell ([[0, 0], [1, 0]] , 1, 0) à True hasMonsterOnCell ([[0, 0], [1, 0]] , 1, 4) à False

Question - 2

[ARRAY 2D] COVID contamination

PROBLEM

We represent COVID contamination between people using a grid.



After the contamination,
2 new cells (orange) are infected

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2 new cells (orange) are infected

- When a cell is between 2 contaminated cell (horizontally or vertically) then this cell become contaminated

To represent the grid in Python we use an array2D with the following values for cells:

- 1 if cell is contaminated
- 0 if cell is NOT contaminated

```
[
[0, 0, 0, 0, 0],
[0, 1, 0, 1, 0],
[0, 1, 0, 0, 0],
```

[0, 0, 0, 1, 0],
[0, 0, 0, 0, 0],
]

We want to know the final grid after the contamination

INPUTS

- An array 2D of integers (1 and 0) : the initial grid
  WARNING: the grid size can change!!!

OUTPUT

- The final grid after contamination

Example:

Input:

[[1, 0, 1], [0, 0, 0], [0, 1, 0]]

Output

[[1, 1, 1], [0, 0, 0], [0, 1, 0]]

Explanations

Initial grid is:

1, 0, 1
0, 0, 0
0, 1, 0

The RED zero is between 2 ones, so this cell will be contaminated

1, 1, 1
0, 0, 0
0, 1, 0

To code this program, you must follow the following steps:

1. Code the function isInfected
2. Code the function willBeInfected
3. Code the function getNextInfectedCells
4. Update the main program : for each new infected cell, set the cell infected (= 1)

Function	isInfected(grid, r, c)
Parameters	grid - array 2D of 1 and 0 r - cell row index c - cell column index
Return value	True if the cell is already infected (before contamination)
Example	grid = [[1, 0, 1], [0, 0, 0] , [0, 0, 0]] isInfected (grid, 0, 0) -> True because the green cell is infected

Function	willBeInfected (grid, r, c)
Parameters	grid - array 2D of 1 and 0 r - cell row index c - cell column index
Return value	True if the cell will be infected A cell is infected is either the ones on left/right or the ones on top/bottom are infected
Example	grid = [[1, 0, 1], [0, 0, 0] , [0, 0, 0]] willBeInfected (grid, 0, 1) -> True because the orange cell is between 2 infected cells (horizontally grid = [[1, 0, 0], [0, 0, 0] , [1, 0, 0]] willBeInfected (grid, 1, 0) -> True because the orange cell is between 2 infected cells (vertically)

Function	getNextInfectedCells (grid)
Parameters	grid - array 2D of 1 and 0
Return value	Return the list of cell that will be infected after contamination
Example	grid = [[1, 0, 1], [0, 0, 0] , [1, 0, 1],] getNextInfectedCells (grid, 0, 1) -> [[0, 1], [2, 1]] because 2 cells will be infected (the orange at [0, 1] and the green at [2, 1] [1, 0, 1] [0, 0, 0] [1, 0, 1]