Practice 30 – DS-SE

Task 01: Consider a 2D list/ array of size 9x9, initialized with ones and zeros. Ones indicates path and zero indicates a hurdle. It is given that first value at 0, 0 is always 1. Write a function print path from 0, 0 to 8, 8. If there exist a path, otherwise print the maximum possible path.
See example:

1	0	0	1	0	1	1	0	0
1	0	0	0	0	1	0	0	0
1	0	0	0	1	1	1	1	1
1	0	0	0	0	1	0	0	0
1	0	0	0	1	0	1	0	0
1	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**
0	1	1	0	0	1	1	1	**1**
0	0	1	1	1	1	1	1	**1**
0	1	1	1	0	1	1	1	**1**

Here, you can see a clear path exists from 0, 0 to 8, 8.

1	0	0	0	1	0	0	0	0
1	0	0	0	1	0	0	0	1
1	0	0	0	0	1	1	0	1
1	0	1	0	0	0	1	1	1
1	0	1	0	0	0	1	1	0
1	**1**	0	1	0	1	1	1	1
0	0	1	1	1	1	1	1	1
0	0	1	0	0	0	1	1	1
1	1	0	0	1	1	0	1	1

In this example, there is path from 0, 0 to 5, 1 only. Afterwards there is no adjacent one to move further. You can move to adjacent right or down, if there is one in the adjacent cell. If both right and down adjacent cells have one, the preference is to move to right. If none of them has one, then stop.

Sample Runs:

```
1 1 0 0 1 0 0 0 0
0 1 1 1 1 1 1 1 0
1 0 1 0 0 1 0 0 1
0 0 1 1 0 1 0 1 0
1 1 1 0 1 1 0 1 1
0 1 1 1 0 1 0 0 1
1 1 1 1 1 0 0 1 0
0 0 0 0 0 0 0 0 1
0 1 0 0 0 1 1 0 1
0, 0 - 0, 1 - 1, 1 - 1, 2 - 1, 3 - 1, 4 - 1, 5 - 1, 6 - 1, 7 - path blocked
---------------------------------------------------
1 0 0 0 1 1 0 0 1
0 0 0 0 1 0 1 0 0
0 1 1 0 0 0 1 1 1
1 0 1 1 0 1 1 0 0
1 1 1 1 1 1 0 1 1
1 0 1 0 1 1 1 1 1
0 0 0 1 1 0 1 0 0
1 1 1 0 1 1 1 1 1
1 0 1 1 0 0 1 1 0
0, 0 - path blocked
---------------------------------------------------
1 0 1 0 1 1 1 1 1
```

1 1 0 0 0 0 1 1 0
1 1 1 0 1 1 1 1 0
0 0 1 0 0 0 0 0 1
1 0 1 1 0 1 1 1 0
0 0 0 1 1 0 1 1 0
1 0 1 0 1 1 0 0 1
1 0 0 0 0 1 1 0 0
1 1 0 0 0 0 1 1 1
0, 0 - 1, 0 - 1, 1 - 2, 1 - 2, 2 - 3, 2 - 4, 2 - 4, 3 - 5, 3 - 5, 4 - 6, 4 - 6, 5 - 7, 5 - 7, 6 - 8, 6 - 8, 7 - 8, 8 -

Task 02: Consider a 2D list/ array of size 9x9. Ignore boundary values that is first and last row & first and last column. Write function to average out remaining values by putting average of eight neighbors.

1 2 8 5 4 7 6 1 6 [For element on second row and second column that is 1, the eight neighbors
9 **1** 4 1 4 7 8 8 8 are, 1, 2, & 8 in first row. 9 & 4 in second row and 4, 5 & 4 in third row. Their sum
4 5 4 6 8 8 5 6 9 1 + 2 + 8 + 9 + 4 + 4 + 5 + 4 = 37. 37 / 8 = 4. Therefore, you can see the
6 7 3 2 4 9 4 2 9 corresponding value below the line is 4.
8 1 2 2 7 9 4 9 3
5 6 1 8 1 1 5 8 6
1 6 6 2 6 1 5 1 2
8 6 2 2 1 4 1 9 3
8 2 5 5 5 7 3 8 1
---
1 2 8 5 4 7 6 1 6
9 4 4 5 6 6 6 6 8
4 5 4 4 5 6 5 5 9
6 4 3 3 5 6 6 5 9
8 4 4 3 4 4 5 6 3
5 5 4 4 3 3 3 4 6
1 4 4 2 3 2 4 4 2
8 4 3 3 3 4 4 4 3
8 2 5 5 5 7 3 8 1

Task 03: Create a Tic-Tac-Toe two player game. You may take a 2D list/ array. You may store '-' in all nine positions. Later take input from players one-by-one. The player has to select a valid i, j position (which is empty and within range). However, the player may give wrong input, so you have to check. If input is valid, you may store 'A' for first player and 'B' for second player in corresponding cell. After each change, redraw the board to show updated status of the game.

After each turn, check the win status, it is possible that a player succeed to occupy any row, column or diagonal on the board. If a player becomes successful to occupy a winning position, print the player A win or player B win and stop the game. Otherwise, after every cell is filled and no player wins, stop game and print draw game message. See sample runs for better understanding:

Sample Runs:

```
- - -
- - -
- - -
Enter input row and column separated by space:0 0
a - -
- - -
- - -
Enter input row and column separated by space:1 1
a - -
- b -
- - -
Enter input row and column separated by space:2 0
```

```
a - -
- b -
a - -
Enter input row and column separated by space:1 2
a - -
- b b
a - -
Enter input row and column separated by space:1 0
```
Congratulations, Play A won the game
```
-----------------------------------
- - -
- - -
- - -
Enter input row and column separated by space:0 0
a - -
- - -
- - -
Enter input row and column separated by space:0 1
a b -
- - -
- - -
Enter input row and column separated by space:0 2
a b a
- - -
- - -
Enter input row and column separated by space:1 0
a b a
b - -
- - -
Enter input row and column separated by space:1 1
a b a
b a -
- - -
Enter input row and column separated by space:1 2
a b a
b a b
- - -
Enter input row and column separated by space:2 1
a b a
b a b
- a -
Enter input row and column separated by space:2 0
a b a
b a b
b a -
Enter input row and column separated by space:2 2
```
Congratulations, Play A won the game
```
-----------------------------------
- - -
- - -
- - -
Enter input row and column separated by space:1 1
- - -
- a -
- - -
Enter input row and column separated by space:0 0
b - -
```

```
- a -
- - -
Enter input row and column separated by space:2 2
b - -
- a -
- - a
Enter input row and column separated by space:0 1
b b -
- a -
- - a
Enter input row and column separated by space:2 1
b b -
- a -
- a a
Enter input row and column separated by space:0 2
```
Congratulations, Play B won the game
```
-----------------------------------
- - -
- - -
- - -
Enter input row and column separated by space:0 0
a - -
- - -
- - -
Enter input row and column separated by space:1 1
a - -
- b -
- - -
Enter input row and column separated by space:0 1
a a -
- b -
- - -
Enter input row and column separated by space:0 2
a a b
- b -
- - -
Enter input row and column separated by space:1 0
a a b
a b -
- - -
Enter input row and column separated by space:2 0
```
Congratulations, Play B won the game
```
-----------------------------------
- - -
- - -
- - -
Enter input row and column separated by space:0 0
a - -
- - -
- - -
Enter input row and column separated by space:1 1
a - -
- b -
- - -
Enter input row and column separated by space:2 2
a - -
- b -
```

```
- - a
Enter input row and column separated by space:0 2
a - b
- b -
- - a
Enter input row and column separated by space:2 0
a - b
- b -
a - a
Enter input row and column separated by space:1 0
a - b
b b -
a - a
Enter input row and column separated by space:1 2
a - b
b b a
a - a
Enter input row and column separated by space:2 1
a - b
b b a
a b a
Enter input row and column separated by space:0 1
```
Game Draw