Intro to 2D Lists

Tic-Tac-Toe Board is organized as: Board[Row][Column]

	Column			
Row		0	1	2
	0	Board[0][0]	Board[0][1]	Board[0][2]
	1	Board[1][0]	Board[1][1]	Board[1][2]
	2	Board[2][0]	Board[2][1]	Board[2][2]

Board is set up like this:

```
Board = [ [ Board[0][0], Board[0][1], Board[0][2] ],
          [ Board[1][0], Board[1][1], Board[1][2] ],
          [ Board[2][0], Board[2][1], Board[2][2] ] ]
```

SETUP

```
rows, columns = map(int, input().split())
matrix = []

for row in range(rows):
    line = list(map(int, input().split()))
    matrix.append(line)

for row in range(rows):
  for column in range(columns):
      print(matrix[row][column], end = " ")
  print()
```

SCALE

```
rows, columns = map(int, input().split())
matrix = []

for row in range(rows):
    line = list(map(int, input().split()))
    matrix.append(line)
factor = int(input())
for row in range(rows):
  for column in range(columns):
      print(matrix[row][column] * factor, end = " ")
  print()
```

MAXIMUM

```
rows, columns = map(int, input().split())
matrix = []
maxVal, maxRow, MaxCol = 0, 0, 0
for row in range(rows):
    line = list(map(int, input().split()))
    matrix.append(line)

for row in range(rows):
  for column in range(columns):
      current = matrix[row][column]
      if current > maxVal:
        maxVal, maxRow, maxCol = current, row, column
print(maxRow, maxCol, end="")
```

DIAGONALS

```
rows = columns = int(input())
matrix = []

for row in range(rows):
    line = list(map(int, input().split()))
    matrix.append(line)

for row in range(rows):
  for column in range(columns)
      print(_____, end = " ")
  print()
```

TRIANGLES

```
rows = columns = int(input())
middle = rows // 2
matrix = []

# Creating a 2D list with dynamic dimensions
matrix = [[0 for _ in range(columns)] for _ in range(rows)]

for row in range(rows):
  for column in range(columns):
    if row + col == rows - 1: # Right Diagonal
        print("*", end = " ")
    elif row == col : # Left Diagonal
        print("*", end = " ")
    elif col == middle:
        print("*", end = " ")
    else:
        print(".", end = " ")
  print()
```

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	0	1	2	3	4
0	*	.	*	.	*
1	.	*	*	*	.
2	*	*	*	*	*
3	.	*	*	*	.
4	*	.	*	.	*

SWAP COLUMNS

```
rows, columns = map(int, input().split())
matrix = []
for row in range(rows):
    line = list(map(int, input().split()))
    matrix.append(line)

col1, col2 = map(int, input().split())

for row in range(rows):
  for column in range(columns):
    if column == col1:
        print(matrix[row][col2]), end = " ")
    elif column == col2:
        print(matrix[row][col1]), end = " ")
    else:
        print(matrix[row][column]), end = " ")
  print()
```

3 4

	0	1	2	3
0	11	12	13	14
1	21	22	23	24
2	31	32	33	34

0 1

	1	0	2	3
0	11	12	13	14
1	21	22	23	24
2	31	32	33	34

BONUS: TIC TAC TOE

```
def checkForWinner(Board):
    # Check for horizontal wins
    for row in range(3):
        if Board[row][0] == Board[row][1] == Board[row][2]:
            return Board[row][0]
    # Check for vertical wins
    for col in range(3):
        if Board[0][col] == Board[1][col] == Board[2][col]:
            return Board[0][col]
    # Check for diagonal wins
    if Board[_][_] == Board[_][_]] == Board[_][_]:
        return Board[0][0]
    if Board[_][_] == Board[_][_] == Board[_][_]:
        return Board[0][2]
    # If no winner, return None
    return None
```

```
Board = [ [ 7, 8, 9],
          [ 4, 5, 6],
          [ 1, 2, 3] ]
turns = 9
```

```
for turn in range(turns):
    if turn % 2 == 0:
        Symbol = "X"
    else:
        Symbol = "O"
    print("Player", Symbol, "it's your turn!")

    choice = input()
    Row = 2 - (choice // 3)
    Column = choice % 3
    Board[Row][Column] = Symbol

    for row in range(3):
        for column in range(3):
            print(Board[row][column], end = " ")
        print()
    print()

    winner = checkForWinner(Board)
    if winner:
        print("Player", winner, "wins!")
        break
```