Homework 1 Advanced Python Programming Due Date: 10/3

1. (Largest rows and columns) Write a program that randomly fills 0s and 1s into a 4×4 matrix, prints the matrix, and finds the rows and columns with the most 1s. Here is a sample run of the program:

```
0011

1101

1010

The largest row index: 2

The largest column index: 2, 3
```

2. (*Markov Matrix*) An $n \times n$ is called a *positive Markov matrix* id each element is positive and the sum of the elements in each column is 1. Write the following function to check whether a matrix is a Markov matrix:

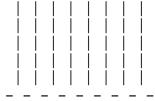
```
def isMarkovMatrix(m):
```

Write a test program that prompts the user to enter a 3×3 matrix of numbers and tests whether it is a Markov matrix. Here are sample runs:

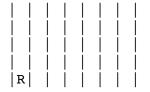
```
Enter a 3-by-3 matrix row by row:
0.15 0.875 0.375
0.55 0.005 0.225
0.30 0.12 0.4
It is a Markov matrix

Enter a 3-by-3 matrix row by row:
0.95 -0.875 0.375
0.65 0.005 0.225
0.30 0.22 -0.4
It is not a Markov matrix
```

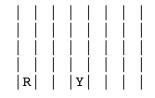
3. (*Game: Connect Four*) Connect Four is a two-player board game in which the players alternately drop colored disks into a seven-column, six-row vertically suspended grid, as shown at cs.armstrong.edu/liang/ConnectFour/ConnectFour.html. The objective of the game is to connect four same-colored disks in a row, column, or diagonal before your opponent does. The program prompts two players to drop a red or yellow disk alternately. Whenever a disk is dropped, the program redisplays the board on the console and determines the status of the game (win, draw, or continue) Here is a sample run:



Drop a red disk at column (0-6): 0



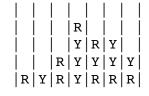
Drop a red disk at column (0-6): 0



•••

...

Drop a red disk at column (0-6): 0



The yellow player won