COSC 1306
Spring 2020

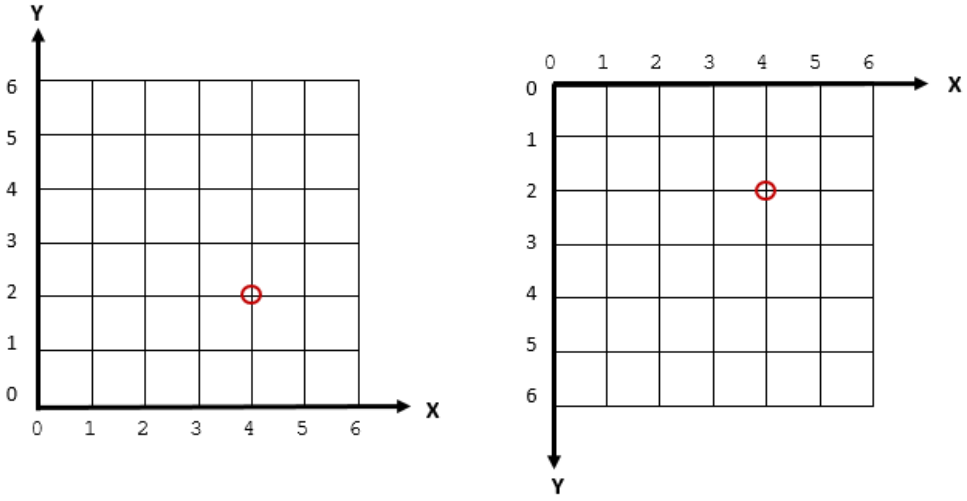
Assignment 5: Functions

[1] **Objectives**: The primary purpose of this assignment is to make sure everyone is familiar with the function including:

- defining a function
- calling a function
- passing parameters to a function
- returning values from a function

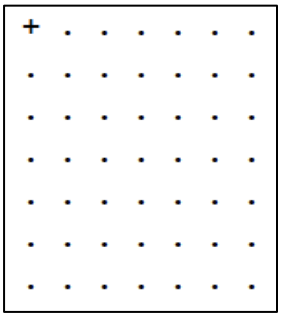
In addition to that, we are practicing other statements introduced in class including: nested loops.

[2] **Requirements**: In this assignment we are going to move on a two dimensional plan, a grid as shown on the figure on the left. The red circle is at location (4, 2) where the x-coordinate is 4 and y-coordinate is 2. Since we want to print the grid and the print function only print in one direction DOWN, we prefer to use the grid on the right. The same point (4, 2) is marked with the same red circle. If we move the red circle down one unit, its coordinate will be at (4, 3). In the assignment we will be moving a circle UP, DOWN, LEFT, and RIGHT within a square board of size N x N (N = 7 in the example below).



This is what your program will do:

- Read in the size of the board,
- Place the starting location at (0, 0),
- Display the board by printing a dot at each integer grid point,
- Repeat the following:
    - Ask the user what to do (UP, DOWN, LEFT, RIGHT, RESET, and EXIT)
    - If the user choose EXIT, then exit the program. Otherwise, move the circle to the new location (an adjacent location or the origin).
    - If the new location is valid, i. e., within the board, the display the grid. Put a + sign on the current location. Otherwise, print an error message and exit the program.



Since this is the first assignment using functions, I am giving you a lot of help. You are required to write the following functions.

Show_Menu()

This function takes no argument and return an integer indicating the user's choice (UP, DOWN, etc.) Since most keyboard looks like the one on the right, we will use "2" for DOWN, "6" for RIGHT, etc. In the previous example of moving from (4,2) to (4,3) the user should choose "2" since he/she is moving DOWN the grid. We also let "5" be the RESET key and "0" be the EXIT key. This function should take about 10 lines of code, most of them are prints.

Show_Grid(x, y)

This function take the coordinates of the current location and display it on the grid. The function does not return any value. This will requires you to use a nested loop to print the information. This function should take about 10 lines of code.

```
Current location: (4,2)
. . . . . .
. . . . . .
. . . . + . .
. . . . . .
. . . . . .
. . . . . .
. . . . . .
```

Move(x, y, choice)

This function takes the coordinates of the current location and the user's choice of move (int) as parameters. It returns the new coordinates based on the user's choice of move. This function is essentially is very long (about 20 lines) if-elif-else statement. Remember to check for invalid choice such as "1". When that happens, print a message and stay at the same location.

Main

```
# Main Program
x = y = 0
size = int(input('Enter the size of the board: '))
print(f'Current location: ({x},{y})')
show_grid(x,y)

while True:
    option = show_menu()
    if option==0:
        print(f'Current location: ({x},{y})')
        break  # Exit
    else:
        x, y = move(x, y, option)
    print(f'Current location: ({x},{y})')
    if 0<=x<size and 0<=y<size: # inside the board
        show_grid(x,y)
    else:  # Game Over
        print('The new location is off the board.')
        break
print('Exit the program')
```

[3] **Output**: See a sample output below and the demo in class..

```
Enter the size of the board: 5
Current location: (0,0)
+ . . . .
. . . . .
. . . . .
. . . . .
. . . . .


Navigation System

  2. Go Down
  4. Go Left
  5. Reset
  6. Go Right
  8. Go Up
  0. Exit Menu System
Select an option: 6
Current location: (1,0)
. + . . .
. . . . .
. . . . .
. . . . .
. . . . .

Navigation System

  2. Go Down
  4. Go Left
  5. Reset
  6. Go Right
  8. Go Up
  0. Exit Menu System
Select an option: 2
Current location: (1,1)
. . . . .
. + . . .
. . . . .
. . . . .
. . . . .
```

Continue from left

```
Navigation System

  2. Go Down
  4. Go Left
  5. Reset
  6. Go Right
  8. Go Up
  0. Exit Menu System
Select an option: 2
Current location: (1,2)
. . . . .
. . . . .
. + . . .
. . . . .
. . . . .

Navigation System

  2. Go Down
  4. Go Left
  5. Reset
  6. Go Right
  8. Go Up
  0. Exit Menu System
Select an option: 0
Current location: (1,2)
Exit the program
```

[4] **Deadline**: 2:15 pm, Wednesday, March 4, 2020.