Midterm Exam 2

Date/Time: 2023.05.09 08:10 – 09:00

(程式檔命名**學號_midterm2.py**，上傳至 Moodle **Midterm2** 上傳區)
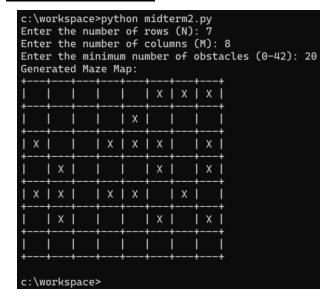
Problem: Maze Map Generation   [上機寫程式部分]

Write a Python program to generate a maze map with a clear path from the starting point (the top-left cell) to the bottom-right cell, and with a minimum number of obstacles that are randomly distributed in the 2-dimensional map. The movement in the path allows only four directions (up, down, left, or right). The program should prompt the user to input the values of *N*, *M*, and *min_obstacles*, where *N* is the number of rows, *M* is the number of columns, and *min_obstacles* is the minimum number of obstacles to add to the maze map. Then display the map with a specific format. We have provided you the main program, together with two functions **generate_maze(N, M)** and **print_maze(maze).** You need to complete the remaining two functions **generate_path(N, M)** and **add_obstacles(maze, min_obstacles)**. The comments in each function can guide you what to do. You may want to use the *random* module with *random.randint* and/or *random.choice* functions to randomly generate the path and to randomly add the obstacles.

Sample Input/Output   (以下是你程式執行後須印出的結果)

```
c:\workspace>python midterm2.py
Enter the number of rows (N): 7
Enter the number of columns (M): 8
Enter the minimum number of obstacles (0-42): 20
Generated Maze Map:
+---+---+---+---+---+---+---+---+
|   |   |   |   |   | X | X | X |
+---+---+---+---+---+---+---+---+
|   |   |   |   | X |   |   |   |
+---+---+---+---+---+---+---+---+
| X |   |   | X | X | X |   | X |
+---+---+---+---+---+---+---+---+
|   | X |   |   |   | X |   | X |
+---+---+---+---+---+---+---+---+
| X | X |   | X | X |   | X |   |
+---+---+---+---+---+---+---+---+
|   | X |   |   |   | X |   | X |
+---+---+---+---+---+---+---+---+
|   |   |   |   |   |   |   |   |
+---+---+---+---+---+---+---+---+

c:\workspace>
```

```
c:\workspace>python midterm2.py
Enter the number of rows (N): 5
Enter the number of columns (M): 6
Enter the minimum number of obstacles (0-20): 0
Generated Maze Map:
+---+---+---+---+---+---+
|   |   |   |   |   |   |
+---+---+---+---+---+---+
|   |   |   |   |   |   |
+---+---+---+---+---+---+
|   |   |   |   |   |   |
+---+---+---+---+---+---+
|   |   |   |   |   |   |
+---+---+---+---+---+---+
|   |   |   |   |   |   |
+---+---+---+---+---+---+

c:\workspace>python midterm2.py
Enter the number of rows (N): 5
Enter the number of columns (M): 6
Enter the minimum number of obstacles (0-20): 30
Re-enter again (0-20): 20
Generated Maze Map:
+---+---+---+---+---+---+
|   |   | X | X | X | X |
+---+---+---+---+---+---+
| X |   |   | X | X | X |
+---+---+---+---+---+---+
| X | X |   |   | X | X |
+---+---+---+---+---+---+
| X | X | X |   |   | X |
+---+---+---+---+---+---+
| X | X | X | X |   |   |
+---+---+---+---+---+---+

c:\workspace>
```

(繳交是交 midterm2.py 檔，不是交截圖)

Need to write comments in your code.