University of Hong Kong
Faculty of Engineering
Department of Computer Science

CSIS/COMP1117B Computer Programming
Assignment 3
(Due: 7 November 2014)

Write a program to find a path in a maze using recursion. A maze is an *n* by *n* square of cells each of which is either blocked or clear. Your program starts at the top left corner and tries to find a path (of clear cells) leading to the lower right corner. Each move is either horizontally (left or right) or vertically (up or down) but never diagonally. Note that a path may not exist.

The maze is represented by a two-dimensional `bool` array, where `true` means blocked and `false` means clear. Your program should ask the user to input the size of the maze followed by the maze row by row. Your program should also maintain another `char` array to record the path found (if there is one) and print it out at the end of processing. Your program should work for mazes of sizes between 4 and 20.

One simple way to find a path is at each step: try moving along one of the allowable directions and try another direction if that one fails. If no possible path can be found, fall back to the previous step and try another path. Note that a move is not allowed if the cell to be moved into is either blocked or that it is outside of the maze. Note also that our simple method may loop in "circles" inside the maze and needs to be augmented so that it will not get into an infinite loop.

Sample Runs.

```
Please input size of maze (a number between 4 and 20 is expected) -> 4
Please input contents of maze row by row,  1 for barrier and 0 for free passage.

0 0 0 0
0 0 0 0
0 0 0 0
0 0 0 0
The maze and the path:
+----+
 srrr|
|   d|
|   d|
|   d
+----+
```

```
Please input size of maze (a number between 4 and 20 is expected) -> 5
Please input contents of maze row by row,  1 for barrier and 0 for free passage.

0 0 0 0 0
1 0 0 0 0
1 1 0 0 0
1 1 1 0 0
1 1 1 1 0
The maze and the path:
+-----+
 srrrr|
|x   d|
|xx  d|
|xxx d|
|xxxxd
+-----+
```

```
Please input size of maze (a number between 4 and 20 is expected) -> 2
**Error** maze size not in range!
Please input size of maze (a number between 4 and 20 is expected) -> 21
**Error** maze size not in range!
Please input size of maze (a number between 4 and 20 is expected) -> 5
Please input contents of maze row by row,  1 for barrier and 0 for free passage.

1 1 1 1 1
1 1 1 1 1
1 1 1 1 1
1 1 1 1 1
1 1 1 1 1
**Error** entrance to maze is blocked!
```

```
Please input size of maze (a number between 4 and 20 is expected) -> 6
Please input contents of maze row by row,  1 for barrier and 0 for free passage.

0 1 1 0 1 1
0 0 1 0 0 0
0 0 0 0 0 1
0 1 0 1 0 1
1 0 1 0 1 0
0 1 0 0 0 0
**Warning** no path from entrance to exit!
The maze and the path:
+------+
 sxx xx|
|  x   |
|     x|
| x x x|
|x x x |
| x
+------+
```

Remarks.

1) Some notations:
   s – start; **u** – up; **d** – down; **l** – left; **r** – right; **x** – barrier
2) Use the filename maze.cpp and submit it through Moodle (not the .exe file).
3) Please follow exactly the input/output format (including the wordings).
4) Please make sure that your source code could be compiled in Dev-C++ environment before submission.