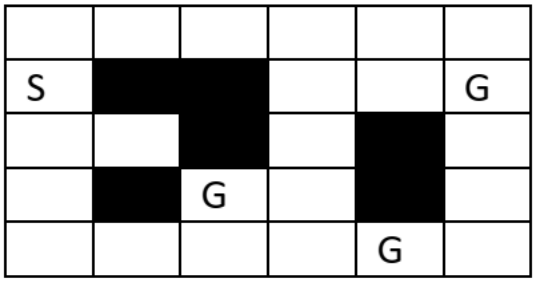
Programming Assignment

This is a robot path planning problem on a grid with obstacles (cells colored black). The following figure shows such a 6 x6 grid with obstacles at 6 cell locations. Assume the robot can move to the cell up, down, left or right to the current cell in one move. The cost for moving is 1.



Suppose the robot wants to find the shortest cost path from start location S to the **closest goal locations** marked by G using A* search algorithm. If there were a single goal an admissible heuristic would be the Manhattan distance between the current location and the goal location (assuming there are no obstacles – this ensures the Manhattan distance will be smaller than the actual cost making the heuristic admissible). However, to solve the problem with more than one goal you need to have an admissible heuristic to the closest goal location. But you do not know which goal location is the closest. (hint: you can find the Manhattan distance to all the goal nodes and then construct a heuristic function from them)

Write a python program to find the shortest path to **the closest goal location**. Your code should work for any grid of size smaller than 10 x 10.
A sample input for the above grid will as follows:

```
5 6     // number of rows and number of columns of the grid
2 1     //sources (S) cell number
3       //number of goals locations, the locations are given below
2 6     //goal cell
4 3     //goal cell
5 5     //goal cell
6       // number of blocked cells. Locations of the blocked as given next
2 2
4 2
2 3
3 3
3 5
4 5
```

The output should be the sequence of moves (L,R,U,or D)

You need to submit the code, and 3 sample input and output files in a zipped file. Name the file with your ID.