## ECE 479/579 Homework 1

Due date: Feb 21st, 11:59 PM

## 1 Question 1

Refer to the python code in D2L: Content  $\rightarrow$  Demos  $\rightarrow$  a\_star, download the file "a\_star.ipynb" and upload it to Google Colab, or other python consoles that you are familiar to. You need to modify the code to fulfill the following requirements:

- 1. The map is generated as the same way as in the original code.
- 2. The agent can move horizontally and vertically, but also diagonally.
- 3. The "h" score is calculated by Euclidean distance instead of Manhattan distance. For example, given the coordinates of the current location (x, y) and the goal location  $(x_g, y_g)$ , the distance is defined by  $\sqrt{(x x_g)^2 + (y y_g)^2}$ .

After you make the modifications, you need to provide the results:

- 1. The length of the path between the start point (0,0) and the goal point (m-1,n-1), where m,n are the height & width of the map, and (m-1,n-1) is the bottom right corner of the map.
- 2. The length of the paths between the start point (0,0) and the goal point (m-1,j), where j=0,1,2,..,n-1.
- 3. Set a different value at the line "random.seed(100)". For example, instead 100, we can set 200, 300,... This code will let python generate different maps stochastically. Provide the "average" length of the path between start point (0,0) and the goal point (m-1,n-1) over 100 different seed values.

**Hint:** to fulfill the requirements above, it would be convenient if we define new functions, and we repeatedly call the functions.

Format: the homework should be turned in as an ".ipynb" file or a ".py" file, and you need to clearly print the outputs of your code.