Homework 9: Path Planning

Integrity: Your honor is extremely important. This academic security policy is designed to help you succeed in meeting academic requirements while practicing the honorable behavior our country rightfully demands of its military. Do not compromise your integrity by violating academic security or by taking unfair advantage of your classmates.

Authorized Resources: You can **ONLY** seek help from the instructor. Homework is an individual exercise.

Path Planning

Create a `jupyter notebook` with the following, you may need to import other libraries too:

```
%matplotlib inline

from __future__ import division, print_function
import matplotlib.pyplot as plt

grid = [[0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0],
        [0, 1, 0, 1, 1, 1, 0, 1, 0, 0, 0, 0],
        [0, 1, 1, 1, 0, 0, 0, 1, 0, 0, 0, 0],
        [0, 1, 0, 0, 0, 0, 0, 1, 0, 0, 0, 0],
        [0, 0, 0, 0, 1, 0, 0, 0, 0, 0, 0, 1],
        [0, 1, 0, 1, 1, 1, 0, 0, 0, 0, 1, 0],
        [0, 1, 1, 1, 0, 0, 0, 0, 0, 1, 0, 0],
        [0, 1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0]
]
```

1. Using the provided grid (map), do:
    1. Plot the map
    2. Starting at (0,0) find a path to (5,8) using a cost of 1 and a standard gradient decent heuristic discussed in class.
2. Did A Star search the entire map?
3. What happens if you set the heuristic to all 0's?
4. Plot the path through the map using a heuristic of all 0's. (*hint:* just redo problem 1 with a different heuristic)
5. Now test what happens when you set the heuristic to a random number. Use `np.random.randint(0, row*col, (row, col), np.uint8)` to randomly pick your heuristic value. Plot the path on the map.
6. Re-run the previous solution 5 times, does it always return the same path when the heuristic is random? Why or why not?