Go visit the webpage at http://qiao.github.io/PathFinding.js/visual/. Read the directions on the upper left, play around with the page for a bit, and then hide the directions (for screenshots later). Now answer the questions below, submitting your typewritten answers and screenshots in a single printed document.

1. Unimpeded search

Keep the default start and goal state. Run A* search (use the Euclidean heuristic), and take a screenshot of the final result. Then, run Dijkstra’s algorithm (you should allow diagonal movement) and screenshot the result.

Explain how the two algorithms differ in their “exploration” of open space. Which one seems more “focused” to you, and why does it behave that way?

2. Search with obstacles

Move the start and goal further away from each other, and add some small, scattered obstacles in between, as shown below:

As before, rerun A* to see how it copes with these obstacles, and take a screenshot. How badly do the obstacles affect the search?

Next, fill in around some of the obstacles near the start position to make a kind of “cup” shape, like this:
Rerun A*, and take a screenshot. Comment on the interaction between the cup shape and the overall search that you can observe in your screenshot.

3. Weighted A* search

Return to the “scattered” obstacles layout, and play with the Weight setting in the A* tab. Try large weights (much bigger than one) and small weights (very close to zero). Compare each one to a weight of 1.0. Which one (big or small) results in a sub-optimal path? Why? Provide a screenshot of both the optimal path and a sub-optimal one. Why would you ever use re-weighting? What do you gain, if optimality is lost?

4. Maze

Imagine that you created a map like this, with the start and goal placed at the entrance and exit of the maze (also imagine that the robot is not allowed to go around the outside of the maze).

Would A* still outperform Dijkstra’s? Why or why not?

5. Other search methods

Do a web search to research one of the other search methods (except for breadth first search) listed on the right hand side of the webpage. Write a paragraph or two explaining what it does, how it relates to the search methods we’ve discussed in class, and who discovered/proposed it, if you can find that out. Make sure to cite your sources.