

### **Question 1 (DFS)**

The first question, with respect to the DFS algorithm, asks if the exploration order was what we would've expected. The answer is yes, it did behave correctly. After running the program, it became clear that the `get_successors()` call returned the possible moves in the same order each time. First, it looked to see if we could move left and right (East and west) and then it looked down and up (south and north). And because of the way DFS works, the path to the solution didn't take any sort of heuristic into account. Which means it searched back and forth, left and right, until it found the solution. The Pacman did not go to all the explored squares because some of the paths terminated. In these situations, it went back to one of the older squares and looked at a different path.

### **Question 2 (A\*)**

Both the Manhattan and the Euclidean heuristics are consistent and usable because the aim to increase performance. They both lead you to the goal in a dependable and logical way. The random heuristic is the exact opposite of this. I ran the random heuristic 5 times, and it took 3 different routes. Each time, it returned a different number of explored squares, and the score varied significantly. The Manhattan and Euclidean heuristics returned the same score because they took the same path. However, the Manhattan heuristic searched a slightly smaller number of squares in each of the mazes. This leads me to believe that the Manhattan distance is probably the best of the 3 different heuristics.

### **Question 3 (Algo Comparison)**

In an open maze, the BFS and the DFS took very different routes. The BFS explored nearly all the squares, and then took the most efficient route. This is because BFS searches by distance, stores all the data, and then returns an optimal solution. On the other hand, the DFS explored a significantly fewer number of squares, but then followed a non-efficient, winding route. This is because DFS digs deeper and deeper and only searches a new route once the current one terminates. In question 2, I talked about the way A\* searched, and the results stayed true for an openMaze as well. The random heuristic was spotty and took winding and ugly routes. While the Manhattan and Euclidean heuristics took very straightforward and logical routes towards the goal state.