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Lab A Report  
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### Report of the maze problem

For the purpose of Lab A, we implemented 4 different types of search algorithms to find the solution to the maze problem. The first algorithm we used was the Depth-First Search (DFS). For the single prize open maze, DFS took 205 steps and expanded 360 nodes. DFS took 124 steps and expanded 460 nodes for the medium maze. As for the large maze, DFS algorithm took 412 steps with 972 expanded nodes.

The second algorithm we looked at was the Breadth-First Search. The open maze was solved by BFS in 45 steps and it expanded 505 nodes. The medium one prize maze was solved by BFS in 94 steps with 604 expanded nodes. As for the large maze, BFS took 148 steps and expanded 1252 nodes.

Likewise, Greedy Best First Search (GBFS) was our third algorithm for this project. For the single prize open maze, GBFS took 79 steps and expanded 148 nodes. GBFS took 118 steps and expanded 133 nodes for the medium maze. As for the large maze, GBFS algorithm took 234 steps with 287 expanded nodes.

Finally, A\* is the final search algorithm we used to find optimal solution to the single prize maze problem. The open maze was solved by A\* in 45 steps and it expanded 233 nodes. The medium one prize maze was solved by A\* in 94 steps with 334 expanded nodes. As for the large maze, A\* took 148 steps and expanded 1112 nodes.

We also used A\* for multi prize maze. When we tried running the Multi prize maze of medium size (and the small size), it did not produce any output. The function was running but it seemed to take forever. So we just tested the multi prize micro maze. The multi A\* algorithm was able to find the optimal path in 21 steps while it had to expand 954 nodes. This algorithm seems to be very computationally heavy for multi prize mazes.