CSC384-A1 Written Part UTORid: lixueer

1.The time complexity of DFS is $O(b^m)$ where m is the length of the longest path in the state space. Path checking only ensures the next state has not been reached along the same path. It will not reduce the accessible states after finishing searching a path. Using path checking in openMaze, since the roads are much “wider”, the m is large and there are many accessible siblings in each search layer which leads to a quite large search space. Therefore, the search takes too long to finish. Cycle checking keeps track of all states added to OPEN during the search. Using cycle checking in openMaze will continually reduce the accessible states after a path is searched, thus the search space is reduced significantly. Therefore, it finds a solution in reasonable time.

2.

(a) 4

(b) NXN - 1

(c) $(4^{NXN} – 4) / 3$

3.

In A* search, the worst case is uniform cost search, i.e. heuristic = 0 for every state.

The maximum branching factor is 4 in Pacman search space. After we search $\lfloor c^*/cmin \rfloor$ layers the optimal solution is in OPEN. However, in the worst case, the optimal solution will stay in OPEN until every other node is explored.

Hence, the maximum number of nodes in OPEN = $(4^{\lfloor c^*/cmin \rfloor} -1) \times 4 + 1$

$= 4^{1+\lfloor c^*/cmin \rfloor} -3$

4.

(a)Yes

(b)No. The upper bound for the ratio: 3

(c)Yes