1)

In our assignment, DepthFirstSearch is implemented only with Path Checking, and not full Cycle Checking.

The difference is that in path checking we only make sure that the current final state of our node has not been reached by any of its ancestors (prefix of current final state), whereas in cycle checking we compare the current final state to any path seen in OPEN so far

2)

(a) The maximum branching factor is 4, since there are only four possible directions at any position (some may be invalid)

(b) N * N

(c) 4^{N*N}

3)

There are at most $4^{\frac{C^*}{cmin}}$ nodes on OPEN at any time before the algorithm terminates. The reason is that since we are given that the minimum cost of every action is cmin, and that we are using an admissible heuristic, the analysis of A* becomes equivalent to UC Search. This means that paths with cost less than C^* can be at most as long as $\frac{C^*}{cmin}$, since any longer path would be of optimal cost, and all of them need to be explored before an optimal one is found.

4)

(a) yes

(b) no, 3h(n)

(c) yes