

Name:

Student ID:

A famous conjecture from Donald E. Knuth states that starting with the number 4, a sequence of factorial, square root, and floor operations can be performed to reach any desired positive integer. For example, we can reach 5 from 4 using:

$$\left\lfloor \sqrt{\sqrt{\sqrt{\sqrt{\sqrt{(4!)!}}}}} \right\rfloor = 5$$

We want to formulate this scenario as a search problem. Given any number, our goal is to apply a search algorithm to find out whether we can start from 4 to reach that number.

1. Model the state space graph for this problem. Your model should describe the states, actions available, successor function, start state, and goal test. 10
2. Considering both the tree search and graph search variants of Breadth-First Search (BFS) and Depth First Search (DFS), which algorithm will you prefer to find the solution? Justify your answer. 5