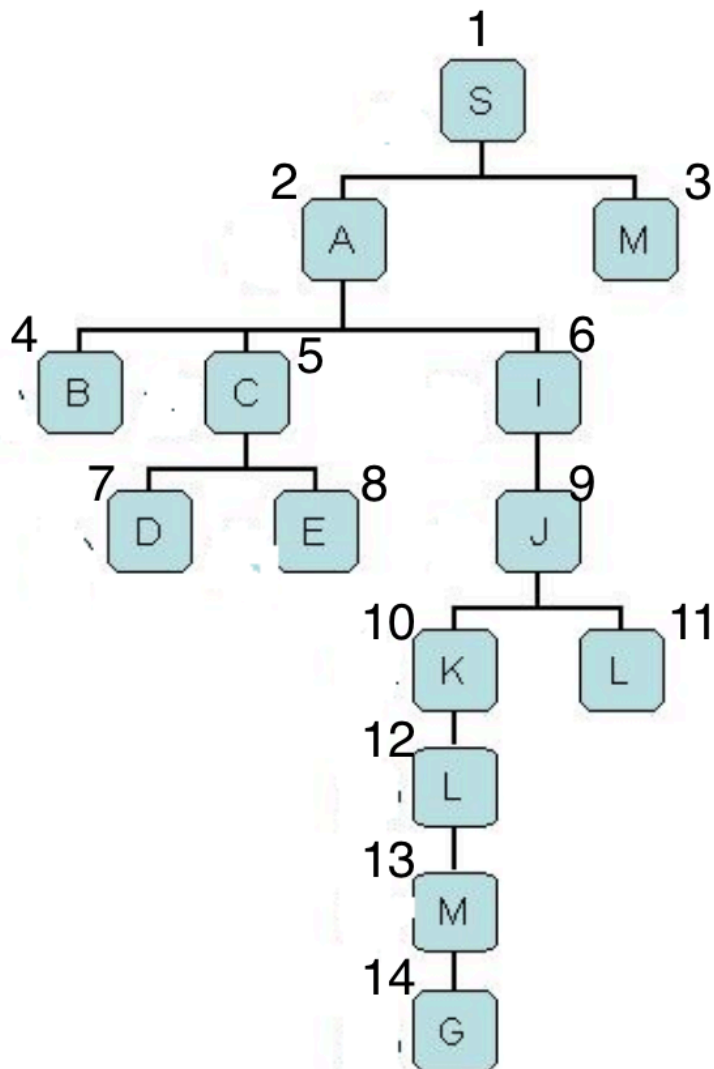# Assignment 2.1

Ajmal Jalal
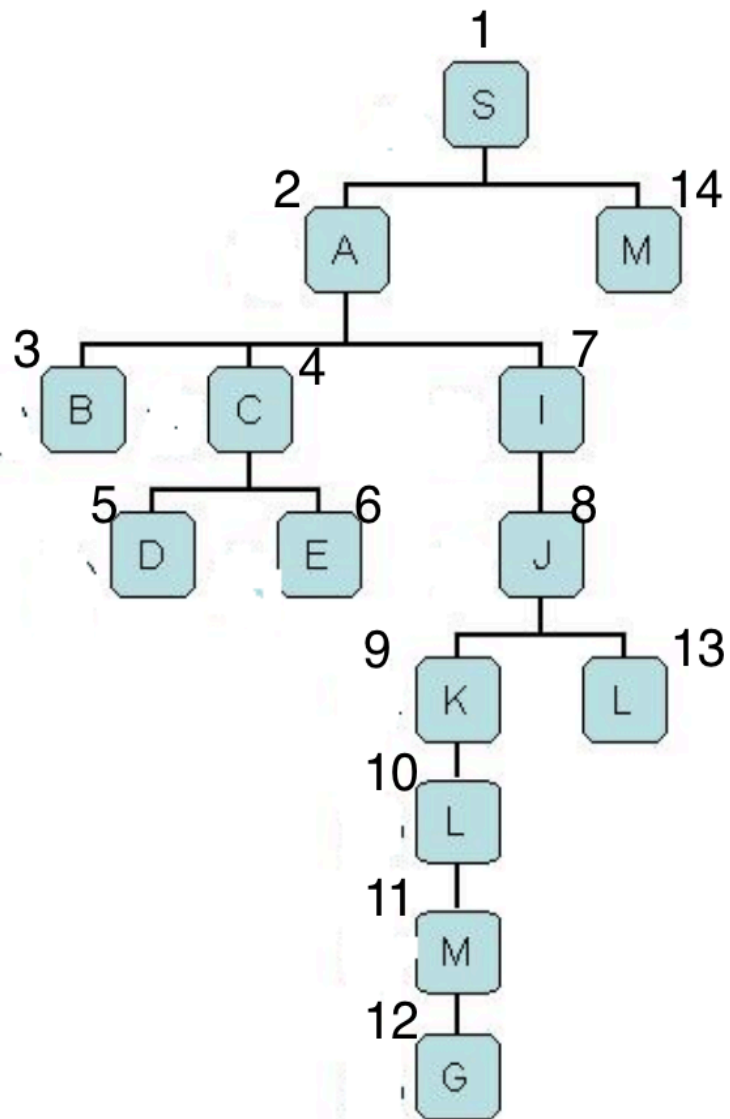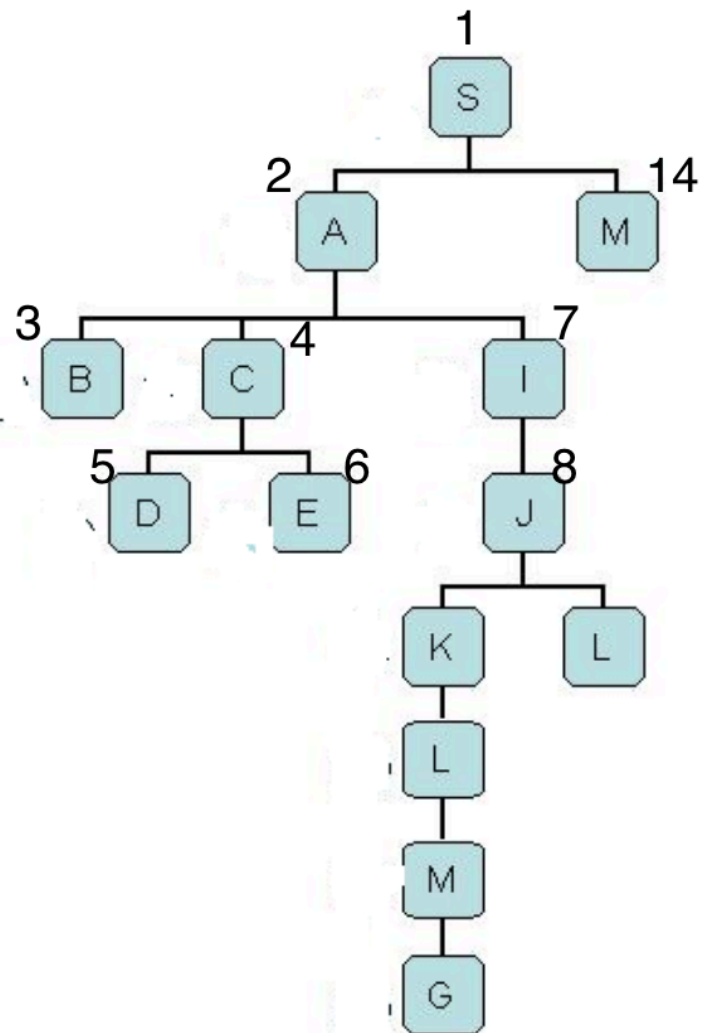
Nov 4, 2024

Problem 1

1 - Breadth First Search:

2 - Depth First Search:

3 - Depth First Search with limit=3:

Problem 2:

Provide a complete problem formulation for the following. Problem formulation should include: initial state, goal test, cost function. They can all be a few words or a sentence for each

1 - *Using only four colors, you have to color a planar map in a way such that no two adjacent regions have the same color.*

Answer:

Initial State*:* An uncolored planar map with defined regions and their adjacencies

Goal Test: Every region is colored AND no adjacent regions share the same color

Cost Function: The number of steps and the amount of time taken to complete the coloring without conflicts.

2 - *You have a program that outputs the message "illegal input record" when fed a certain file of input records. You know that processing of each record is independent of the other records. You want to discover what record is illegal.*

Answer:

Initial State: A file containing multiple input records, all of which need to be processed by the program.

Goal Test: Identify and isolate the specific input record that causes the program to output the message "illegal input record". This goal will be reached when the program outputs the message.

Cost Function: Number of program executions needed and the time it takes to find the illegal record.

Problem 3:

Your goal is to navigate a robot out of a maze. The robot starts in the center of the maze facing north. You can turn the robot to face north, east, south, or west. You can direct the robot to move forward a certain distance although it will stop after hitting a wall.

Answer:

Initial State: The robot starts at the center of the maze, which is at coordinates (0, 0). The robot is initially facing north.

Goal Test: The robot aims to reach any edge of the maze. The robot is at any position where either the x-coordinate is ±1 or the y-coordinate is ±1 (since the maze ranges from (−1,−1) to (1, 1)).

Successor Function: The robot can move forward or change its facing direction from initially facing north to east, south, or west. The robot will stop if it encounters a wall. Each action leads to a new state with updated position and/or direction.

Cost Function: Each action (turning or moving forward) has a cost of 1 and a time of 1. The total cost will be the sum of all action costs taken to reach the goal state and the time it takes.