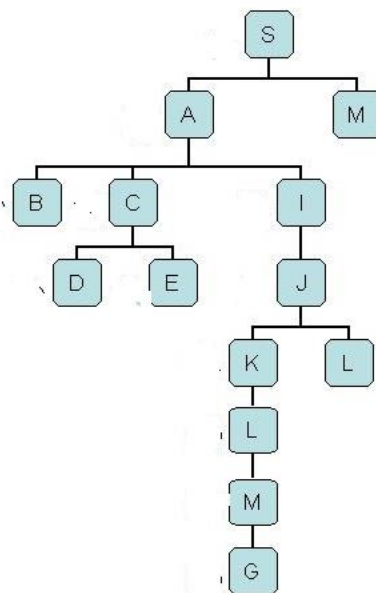## Assignment 2.1:

Submit by Day 7 of the learning week.

Instructions

1. Consider the following tree

a) Breadth first search – Show the order in which the nodes will be visited by placing a number next to the node in the figure. For example if node E will be visited as 6_{th} node place 6 next to the node in the tree. S will always be 1. [10 points]

S(1) A(2) M(3) B(4) C(5) I(6) D(7) E(8) J(9) K(10) L1 (11) L2(12) M(13) G(14)

b) Repeat a) for depth first search [10 points]

S(1) A(2) B(3) D(4) E(5) C(6) I(7) J(8) K(9) L2(10) M(11) G(12) L1(13) M(14)

c) Repeat a) for depth first search with limit *l*=3. [5 points]

S(1) A(2) B(30 D(4) STOP DEEPER HERER E(5)STOP DEEPER HERE C(6) I(7) J(8)STOP M(9) STOP DEEPER HERE

2) Provide a complete problem formulation for the following. Problem formation should include: initial state, goal test, cost function. They can all be a few words or a sentence for each. [25 points]a) Using only four colors, you have to color a planar map in a way such that no two adjacent regions have same color b) 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.

2a) Map Coloring with Four Colors

- Initial State: A blank (uncolored) map with regions and adjacency constraints.
- Goal Test: The entire map is colored, ensuring no two adjacent regions have the same color.
- Cost Function: Number of colors used or the number of conflicts resolved.

2b) Finding the illegal input record

- Initial State: A list of all records in the input file
- Goal Test: Identifying the exact record(s) that cause the error message.
- Cost Function: Number of records tested before finding the faulty record.

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. [20 points] a) Formulate this problem. This means you will have to describe initial state, goal test, successor function, and cost function. Successor function is a description of the robots successive actions after the initial state.We will define the coordinate system so that the center of the maze is at (0, 0), and the maze itself is a square from (−1,−1) to (1, 1)

3a) Navigating a Robot Out of a Maze

- Initial State : The robot starts at (0,0), facing north.
- Goal Test: The robot reaches an exit point
- Successor Function:
    o Move Forward (stops if a wall is hit)
    o Turn Left (change direction)
    o Turn Right (change direction)
- Cost Function: The number of moves taken to exit the maze.

Project Deliverables and Format:

Submit as a single file: Word or PDF. If you take pictures with a phone or scan into PDF, use large font (12 point and up) and high quality. Unreadable cluttered submissions with small font sizes will not be graded.