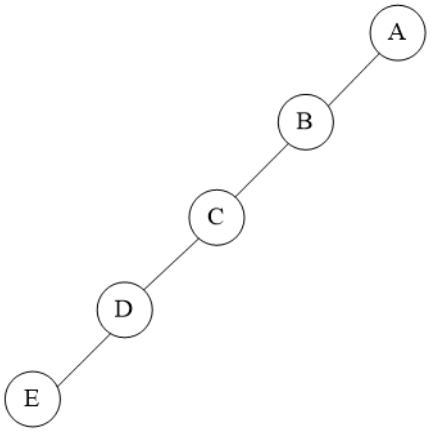
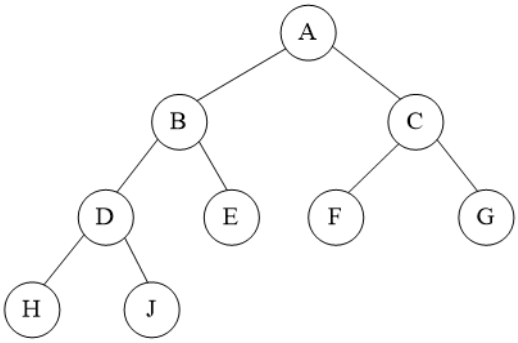
Assignment 4
Due date: 18 December 2024
TA: 薛凱駿, 楊承霖, 吳奇軒 (ECG 706)

1. (20%) Write out the inorder, preorder, postorder, and level-order travels for the binary trees (a) and (b).



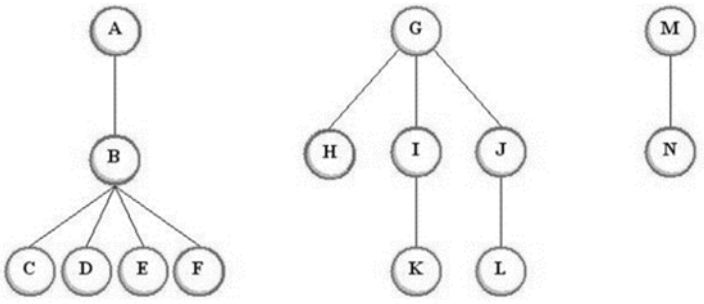
(a)



(b)

2. (20%) Transforming the forest into a binary tree using the rule:

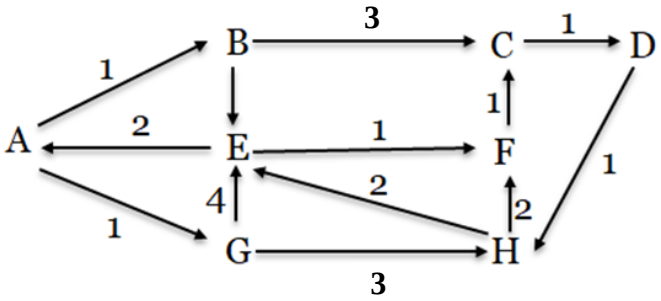
> - If $T_1, \ldots, T_n$ is a forest of trees, then the binary tree corresponding to this forest, denoted by $B(T_1, \ldots, T_n)$
> - Root equal to root(T_1)
> - Left subtree equal to $B(T_{11}, T_{12}, \ldots, T_{1m})$, where $T_{11}, T_{12}, \ldots, T_{1m}$ are subtrees of root(T_1); and has right subtrees $B(T_2, \ldots, B_{Tn})$.



3. (20%) Compute the generating function for the number of ways of computing multiplications of n square matrices of the same shape.

   Note: You should only give the closed form of the function (e.g., $f(x) = 1/(x-1)$).

4. (20%) A weighted directed graph G is given as follows. Filling in the given table using Dijkstra's algorithm to find shortest path from A to all nodes. If more than 1 vertices have the same minimum distance, choose the vertex with alphabet priority.



Iteration	Vertex Selected	Distance							
		A	B	C	D	E	F	G	H
Initial									
1									
2									
3									
4									
5									
6									
7									

5. (20%) Answer the questions with respect to the following graph.
   (a) Show the result by the Kruskal's algorithm.
   (b) Starting from node A, show the result by the Prim's algorithm.
   (c) Starting from node D, give the sequence by depth-first-search. If you have multiple choi ces, just follow the alphabetical order.
   (d) Starting from node E, give the sequence by bread-first-search. If you have multiple choic es, just follow the alphabetical order.