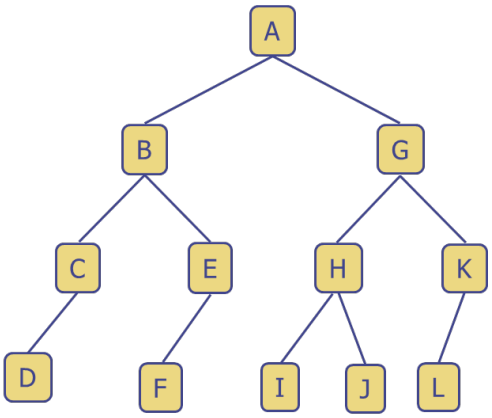
Tutorial 5

Question 1: Trees

For each of the following trees, fill in its corresponding three tables:

- The first table is about generic properties of the tree.
- The second table is about properties for specific nodes in the tree.
- The third table contains an array. For each node in the tree, you should mark which position in the array it should occupy.

Tree 1



Property	Answer
Root Node	
Internal Nodes	
External Nodes	
Height of tree	
Inorder traversal	
Preorder traversal	
Postorder traversal	

	Depth	**Ancestor**	**Descendants**

A			
B			
C			
D			
E			
F			
G			
H			
I			
J			
K			
L			

0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
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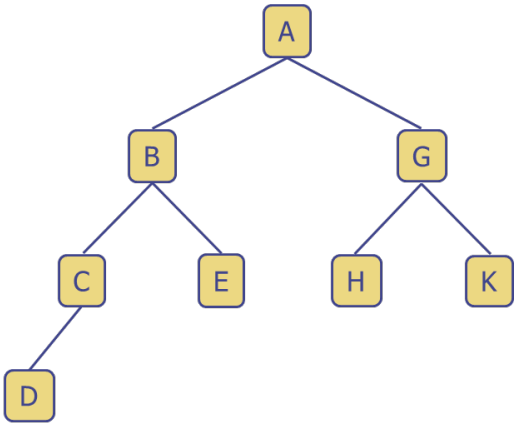
Tree 2



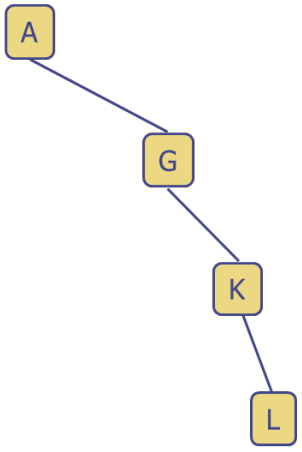
Property	Answer
Root Node	
Internal Nodes	
External Nodes	

Height of tree	
Inorder traversal	
Preorder traversal	
Postorder traversal	

	Depth	**Ancestor**	**Descendants**
A			
B			
C			
D			
E			
G			
H			
K			

0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
-															

Tree 3



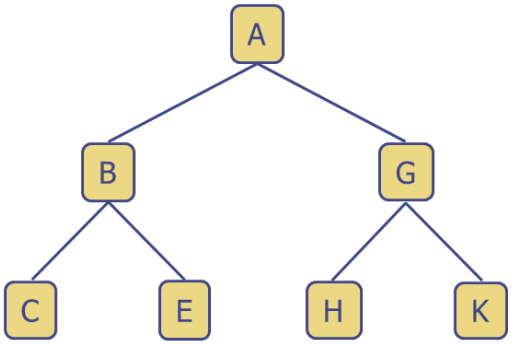
Property	Answer

Root Node	
Internal Nodes	
External Nodes	
Height of tree	
Inorder traversal	
Preorder traversal	
Postorder traversal	

	Depth	**Ancestor**	**Descendants**
A			
G			
K			
L			

0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
-															

Tree 4



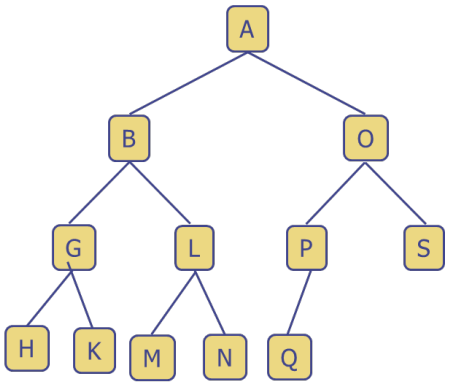
Property	Answer
Root Node	

Internal Nodes	
External Nodes	
Height of tree	
Inorder traversal	
Preorder traversal	
Postorder traversal	

	Depth	**Ancestor**	**Descendants**
A			
B			
C			
E			
G			
H			
K			

0	**1**	**2**	**3**	**4**	**5**	**6**	**7**
-							

Tree 5



Property	Answer

Root Node	
Internal Nodes	
External Nodes	
Height of tree	
Inorder traversal	
Preorder traversal	
Postorder traversal	

	Depth	**Ancestor**	**Descendants**
A			
B			
G			
H			
K			
L			
M			
N			
O			
P			
Q			
S			

0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
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Additional questions:

1. Which of the above trees, if any, are proper binary trees?
2. How big of an array do we need to store an arbitrary binary tree of height *h*?
3. We have shown how to use an array representation for binary trees. How would we extend this to work on ternary trees?