

## P304 - 3

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### Prove:

$F = \{T_1, T_2, T_3, \dots, T_n\}$ , associated binary tree  $T$ , Trees  $T_1, T_2, T_3, \dots, T_n$  in  $T$  has new name  $T_1', T_2', T_3', \dots, T_n'$

① About root of  $T$ : The root of  $T$  is the the root of  $T_1$ . The left subtree of  $T$  obey the order of binary tree transform of the  $T_1$ . So the preorder of  $T$ 's root and left subtree gives the same result of  $T_1$  in the forest;

② Not root of  $T$ : rest of the forest as  $F' = \{T_2, T_3, T_4, \dots, T_n\}$  become the right subtree of  $T$  and every root of  $F'$  are linked as the right child of the former one.  $T_2, T_3, \dots, T_n$  their children become the left child while obeying the binary tree order in  $T$ . And they become  $T_1', T_2', T_3', \dots$ . So Assume:

- start to preorder traversal  $T_k'$  ( $k > 1$ )
- visit( $T_k'.\text{root}$ )
- visit( $T_k'.\text{leftSubtree}$ ), this step gives the same result of the preorder of  $T_k$  in  $F$  due to the definition
- finish preorder traversal  $T_k'$  ( $k > 1$ )

Then we come to  $T'(k+1)$ , this step also follow the same order when preorder traversal the  $F$  which means  $T(k+1)$  is traversed after  $T_k$

the traversal steps of  $T'(k+1)$  are the same as  $T_k'$

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$T_n'$  also gives the same order.

Conclude①②, the preorder traversal of a forest and the preorder traversal of its associated binary tree give the same result.