1. (10%) Write down the sequence of the 7 keys in the array that results after performing 3 successive delete-the-max operations on the following maximum-oriented **binary heap** of size 10:
   97 82 89 34 66 78 85 15 28 51

2. (10%) Write down the sequence of the 13 keys in the array that results after inserting the sequence of 3 keys: 25 16 12
   into the following maximum-oriented **binary heap** of size 10:
   86 82 77 75 70 35 68 31 45 30

3. (20%) Write a pseudocode function that can re-construct a **binary tree** by using its preorder and inorder traversals. Please return the root of the binary tree as the output.
   Note: A node in a **binary tree** has two pointers, named 'left' and 'right', respectively, where the 'left' pointer is used to find the left child of the node and the 'right' pointer is used to find the right child.

4. (20%) Write a pseudocode function that removes the nodes in even positions (the second, fourth, sixth, and so forth) in a given **linked list**. No return values are expected.
   Note: A node in a null-terminated **linked list** has one pointer, named 'next', that points to the next node if it is not null.

5. (20%) Given a reference that points to a node *x* in a **doubly circular linked list**. Please write a pseudocode function to delete the node *x* from the doubly circular linked list. No return values are expected.
   Note: A node in a **doubly circular linked list** has two pointers, named 'next' and 'prev', respectively, where the 'next' pointer is used to find the next node and the 'prev' pointer is used to find the previous one.

6. (10%) a. List both the advantages and disadvantages of **adjacency list** and **adjacency matrix** for the graph representation, respectively.
   (10%) b. Analyze the complexity of depth-first search (DFS) on a graph represented by the adjacency list or adjacency matrix, respectively.

試題隨卷繳回