HW7 실습: 트리 순회
(과제 아닙니다, 제출하지 않습니다.)

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다음을 작성하라.

1(a). makefile

명령어: cat makefile / vi makefile

hw7: (tab) hw7.o
(tab) g++ -o hw7 hw7.o
hw7.o: (tab) bt.h

1(b). input.in

명령어: vi input.in

35.3 15.7 81.5 4.5 66.7 91.2 2.3 5.2 88.2 94.5

2. hw7.cpp

```
#include "bt.h"
#include <iostream>
using namespace std;
int main()
{
 Tree<double> tree;
 double dval;

 cout << "Enter doubles:₩n";

 while (cin >> dval) tree.Insert(dval);
 cout << endl << "Preorder traversal: "; tree.Preorder();
 cout << endl << "Inorder traversal: "; tree.Inorder();
 cout << endl << "Postorder traversal: "; tree.Postorder();
 cout << endl << "Levelorder traversal: "; tree.Levelorder();
 cout << endl << "Stack Preorder traversal: "; tree.StackPreorder();
 cout << endl << "Stack Postorder traversal: "; tree.StackPostorder();
 cout << endl;

}
```

3. bt.h

```
#ifndef TREE_H
#define TREE_H
#include <iostream>
#include <queue>
#include <stack>
using namespace std;

template <class T>
struct Node {
 Node(T d, Node<T> *left=0, Node<T> *right=0)
 : data(d), leftChild(left), rightChild(right) { }

 Node<T> *leftChild;
 T data;
 Node<T> *rightChild;
};

template <class T>
class Tree {
public:
 Tree() { root = 0; } // empty tree
 void Insert(T &value) { Insert(root, value); }
 void Preorder() { Preorder(root); }
 void Inorder() { Inorder(root); }
 void Postorder() { Postorder(root); }
 void StackPreorder();
 void StackPostorder();
 void Levelorder();
```

```
private: // helper 함수들
 void Visit(Node<T> *);
 void Insert(Node<T>* &, T &);
 void Preorder(Node<T> *);
 void Inorder(Node<T> *);
 void Postorder(Node<T> *);

 Node<T> *root;
};

template <class T>
void Tree<T>::Visit(Node<T> *ptr) { cout << ptr->data << " "; }

template <class T>
void Tree<T>::Insert(Node<T>* &ptr, T &value) { //Insert 의 helper 함수
 if (ptr==0) ptr = new Node<T>(value);
 else if (value < ptr->data) Insert(ptr->leftChild, value);
 else if (value > ptr->data) Insert(ptr->rightChild, value);
 else cout << endl << "Duplicate value " << value << " ignored₩n";}

// 3-1. Preorder, Postorder, Inorder 구현
// 3-2. Levelorder, Stackpreorder, Stackpostorder 구현

// Levelorder 구현에는 큐를 사용
// prefix 로 Stack 들어간 함수 구현에는 스택을 사용하되, helper 함수를 사용하지
않는, 즉, 재귀를 이용하지 않는 standalone 함수로 preorder, postorder 구현
```

5. 결과

컴파일: make hw7

실행: hw7 < input.in OR ./hw7 < input.in

```
Preorder traversal: 35.3 15.7 4.5 2.3 5.2 81.5 66.7 91.2 88.2 94.5
Inorder traversal: 2.3 4.5 5.2 15.7 35.3 66.7 81.5 88.2 91.2 94.5
Postorder traversal: 2.3 5.2 4.5 15.7 66.7 88.2 94.5 91.2 81.5 35.3
Levelorder traversal: 35.3 15.7 81.5 4.5 66.7 91.2 2.3 5.2 88.2 94.5
Stack Preorder traversal: 35.3 15.7 4.5 2.3 5.2 81.5 66.7 91.2 88.2 94.5
Stack Postorder traversal: 2.3 5.2 4.5 15.7 66.7 88.2 94.5 91.2 81.5 35.3
```