COSC1076 | Advanced Programming Techniques

Revision Questions | Week 09

These are self-revision questions, to help you track if you are understanding the weekly course content.

You should FIRST answer these questions using "pen-and-paper". Only after this should you test your answers by writing and compiling programs.

1. What are the similarities and differences between C++ Classes and C-style structs?
2. Using the basic Linked List ADT that has been used over the past few weeks, implement a ***recursive*** version of the following methods:
   (a) `contains`
   (b) `deleteBack`
3. For a Tree data structure, define the following terms
   (a) Node
   (b) Root
   (c) Leaf
   (d) Child
   (e) Parent
4. Describe the structure of a Binary Search Tree.
5. Using the following ADT for a Binary Search Tree, answer the questions:

BSTNode.h

```cpp
#include <memory>

class BST_Node {
public:
    BST_Node(int data);
    BST_Node(const BST_Node& other);
    ~BST_Node();

    int   data;
    std::shared_ptr<BST_Node> left;
    std::shared_ptr<BST_Node> right;
};
```

BST.h

```cpp
#include <memory>

class BST {
public:
    BST();
    ~BST();

    void clear();
    bool contains(const int data) const;
    void add(const int data);

private:
    std::shared_ptr<BST_Node> root;
};
```

   (a) Draw the resulting tree after executing the following sequence

```
BST* bst = new BST();
bst->add(10);
bst->add(12);
bst->add(-1);
bst->add(10);
bst->add(11);
```

(b) Describe the sequence of operations, (such as calling a deconstructor and variables going out of scope) that occurs when the deconstructor for the BST in the above question is called.