

**PLEASE NOTE: Before you start remove any flash memory devices from the PC.
Failure to unplug flash memory devices may result in an F grade.**

Please include your name at the top of each .cpp and upload to Moodle. Do NOT zip

Note: You should write only one main program, which includes all the functionality you have been asked for to test your implementation.

Develop templated binary search tree and tree node classes. **[10 marks - declaration]**

Your class should have the following methods (where T is the Templated type):

[54 marks]

- `BinarySearchTree()` // default constructor 2 marks
- `~BinarySearchTree()` // destructor 4 marks
- `void insert(T);` // 11 marks see notes 1 & 2 below
- `bool search(T)` // 6 marks
- `bool isEmpty() const` // 2 marks
- `bool isLeaf() const` // 2 marks
- `void remove(T);` // 19 marks
- `void print_inorder() const` // 2 marks
- `void inorder(tree_node<T>*)` // 6 marks – this is a private method used by `print_preorder` above

Note 1: Inserts can be implemented either recursively or iteratively (comment and explain your choice of implementation 4 marks).

Note 2: Your tree has to cater for duplicates (assume duplicate data values).

Note 3: Tree traversals should be implemented recursively.

Code a main program that tests your BST methods using integers, doubles and then chars.
Also test for duplicate data values **[18 marks]**

Further 18 marks for good coding practice, e.g. clear well-presented code, well-chosen variable and class names and appropriate comments etc.– also if you don't put your name on the file or zip you may lose these. **[18 marks]**