Université Libanaise
Faculté d'Information

Br I

الجامعة اللبنانية
كلية الاعلام
الفرع الاول

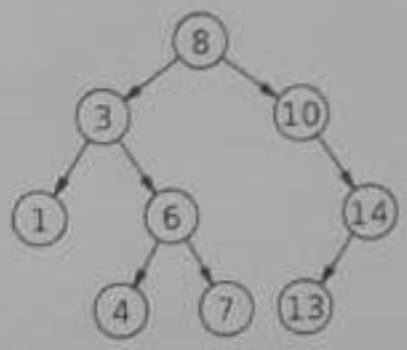
الدورة الاولى للعام الجامعي
2025/2024

المادة: Data Structure and Algorithms
المدة:ساعتان
الاستاذ: د. نادين زبيب

المرحلة: اجازة
السنة المنهجية: الثانية
الدورة الاولى

Exercise I: (20 pts)

Write a **recursive** method in the class BST that returns the sum of all values in the leaf nodes (leaves) in a Binary Search Tree that are smaller than the value in the root (these are the nodes in the left subtree of the root). Suppose we have the below BST, the method will return 12, which is the sum of the values 1, 4, and 7.



L Q smaller
right bigger

Exercise II: (30 pts)

Given the following BST:

What is the output of Post-Order traversal?
What is the output of Pre-Order traversal?
What is the output of In-Order traversal?
What will the above tree look like after deleting the node 10?
What is the output of the following code where root is the root of the above given tree:

```
TreeNode curr =root;
while(curr !=null)
{
     If(curr.value %3 ==0){
          S.o.pln(curr.value);
          curr=curr.right;
     }
     else curr = curr.left;
}
```

Exercise III. (25 pts)

Write a method, named "areSame", that takes as parameter a linked list and returns true if all the elements in the list are the same and false otherwise.

Example 1:

If L= 10 → 11 → 1 → 3 → 5 → 7 → 10, then your method should return false.

Example 2:

If L= 10 → 10 → 10 → 10 → 10, then your method should return true.

Exercise IV:(10 pts)

Give a big-Oh characterization, in terms of n, of the running time of the below method.

```
int x = 0;                                  ----------------------

for (int i = 1; i <= n; i++)                ----------------------

    for (int j = 0; j < n; j+=2)            ----------------------

        x += i * j;
```

Exercise V:(15 pts)

Write a recursive method to calculate the sum of all numbers from 1 to n.

Write the main to test your method.

Sample Output:

Sum of numbers from 1 to 7 is: 28