

CEng242 Homework 1

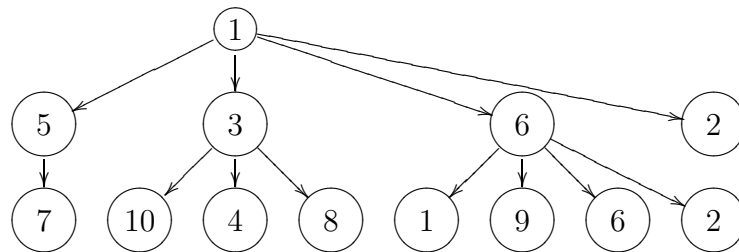
Due 15th March 2003

In this homework you will implement preorder and postorder traversal of quad-trees.

You are given the following data type for an quad-tree. tree:

`datatype Ntree = Null | Node of int*Ntree*Ntree*Ntree*Ntree | Leaf of int;`

In the `Node` 5-tuple first element is the node content of the parent and the other elements are `Ntree` typed children. These values can have `Null` value indicating child at that position does not exist. A leaf node with value x can be represented as `Leaf(x)`. It is practically same with `Node(x,Null,Null,Null,Null)`



The above tree can be represented by the `int Ntree` typed value:

```
Node(1, Node(5,Leaf 7,Null,Null,Null),
      Node(3,Leaf 10, Leaf 4, Leaf 8,Null),
      Node(6,Leaf 1, Leaf 9, Leaf 6, Leaf 2),
      Leaf 2)
```

Write two functions:

`postorder: Ntree → int list`

and

`preorder: Ntree → int list`

Which will return the list of values from postorder and preorder traversals of the tree. In the postorder traversal, first subtrees are traversed and then the current node content is traversed. In the preorder traversal, first the current node is traversed and then the subtrees are traversed in the same manner.

For example if the tree above is in variable `x`,

‘`postorder x`’ will return: `[7,5,10,4,8,3,1,9,6,2,6,2,1]`

and

‘`preorder x`’ will return: `[1,5,7,3,10,4,8,6,1,9,6,2,2]`

Write your ML functions together with the type declaration in a single file. Submission details will be announced later.