

Test #1

Next Wed, 10:10 - 11 a.m. in EX300, EX310
- we'll talk today.

A1

- solution aren't published, but enthusiastically
discussed CSC148 fall 2013 → face-to-face.
~10 days.

recursive structures
week 5

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Outline

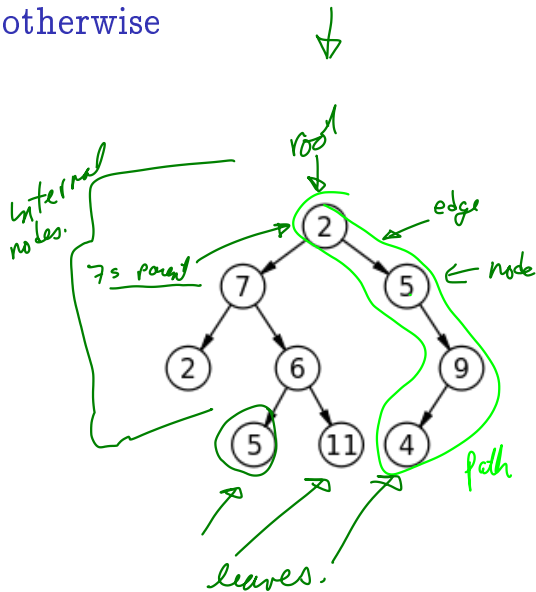
Recursion exercise: Tower of Anne Hoy

```
def toah(n: int, src: int, dest: int, inter: int) -> None:
    """
    Print how to move n>0 cheeses from src to dest using
    intermediate inter.
    """

    if n > 1:

else:
```

recursion, natural and otherwise



more terminology

- ▶ **leaf**: node with no children
- ▶ **internal node**: node with one or more children

▶ **subtree**: tree formed by any tree node together with its descendants and the edges leading to them.

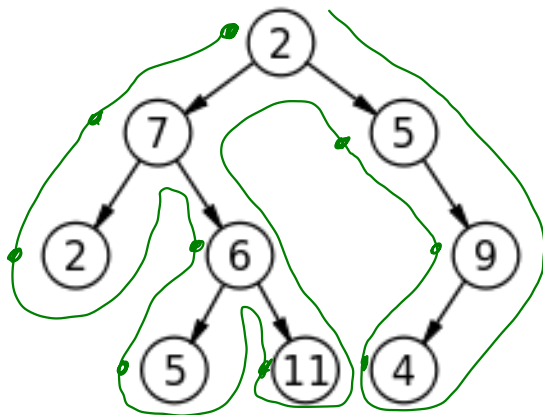
- ▶ **height**: Maximum path length in a tree, where the length of a path is the number of edges in it. **nb**: The length of a path is sometimes defined by the number of **nodes** in it, which makes it taller by 1.

binary trees \rightarrow $BF = 2$

- ▶ **arity, branching factor**: maximum number of children for any node.

pre-order traversal

Visit root, then pre-order left subtree, then pre-order right subtree



exercise: code for preorder traversal

```
"""
A TreeList is a Python list with 3 elements
  --- element 0 is a value
  --- element 1 is either a TreeList or None
  --- element 2 is either a TreeList or None
"""

def preorder(tl: 'TreeList') -> list:
    """
    Return list of values in tl in preorder
    """
```

>>> Tl = None

>>> T = [5, [4, None, None], [3, [2, None, None], [1, None, None]]]

>>> preorder(T)

[5, 4, 3, 2, 1]

"""

if tl == None:

return []

else:

return

[tl[0]]

+ preorder(tl[1]) + preorder(tl[2])

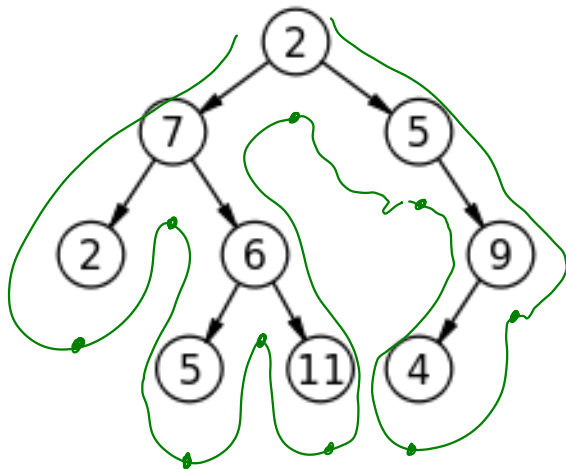


in-order traversal

in order

in order

Visit in-order left subtree, then root, then in-order right subtree



post-order traversal

Visit post-order left subtree, then post-order right subtree, then root

