CSC148: Trees

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Question 1

Explain in plain English the purpose of the following `mystery` function.

```
def mystery(t):
  '''(BinaryTree) -> bool'''
  if not t:
    return True
  if not t.left and not t.right:
    return True
  return t.left != None and t.right!= None \
         and mystery(t.left) and mystery(t.right)
```

Question 2

Give an example of two distinct binary trees t_1 and t_2 such that their preorders are the same and their postorders are the same.

Can you give an example of two distinct binary trees t_1 and t_2 such that their preorders are the same and their inorders are the same?

Question 3

Write the following function.

```
def same_leaves(t1, t2):
  '''(BinaryTree, BinaryTree) -> bool

  Return True iff t1 and t2 have the same leaves.
    '''
```

Question 4

What is the maximum number of nodes in a binary tree of height h?

Challenge: what is the maximum number of nodes in a **ternary** tree ("branching factor at most 3") of height h?

Question 5

What kind of tree traversal is this?

```
def mystery_order(t):
  '''(BinaryTree) -> list'''
  lst = []
  s = Stack()
  s.push(t)
  while not s.is_empty():
    t = s.pop()
    if t:
      lst.append(t.item)
      s.push(t.right)
      s.push(t.left)
  return lst
```