Data Structures

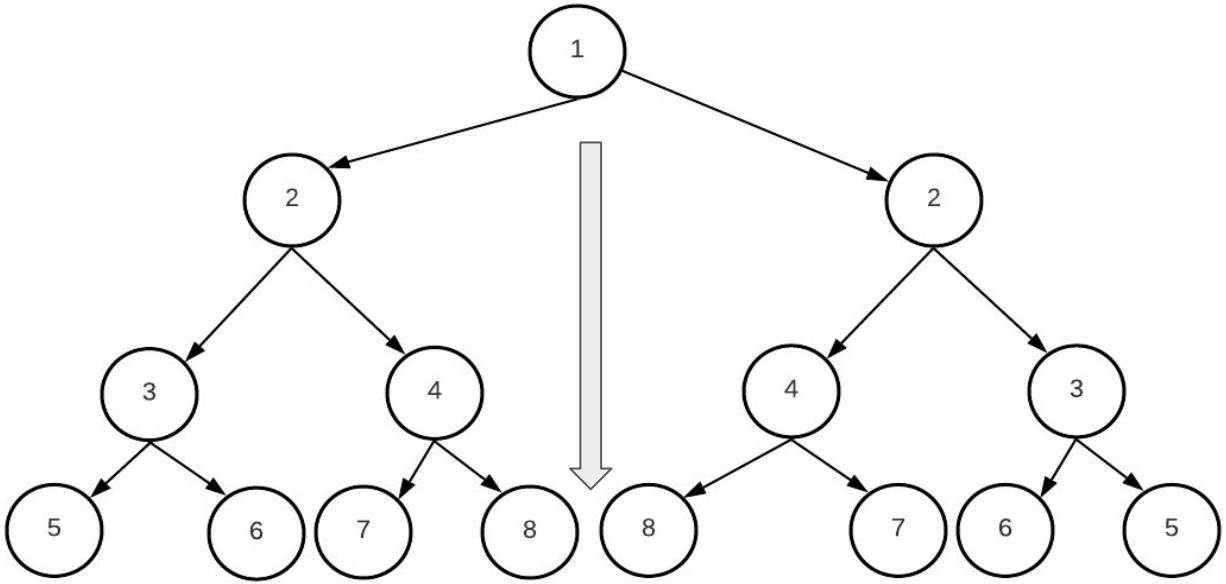
Homework 5

Mostafa S. Ibrahim
Teaching, Training and Coaching since more than a decade!

Artificial Intelligence & Computer Vision Researcher
PhD from Simon Fraser University - Canada
Bachelor / Msc from Cairo University - Egypt
Ex-(Software Engineer / ICPC World Finalist)

Problem #1: Symmetric Tree

- A tree is symmetric if it mirror around its center
- Observe 3rd level
  - 5 6 7 8
  - Then
  - 8 7 6 5
- A tree is mirror if root->left & root->right are mirror

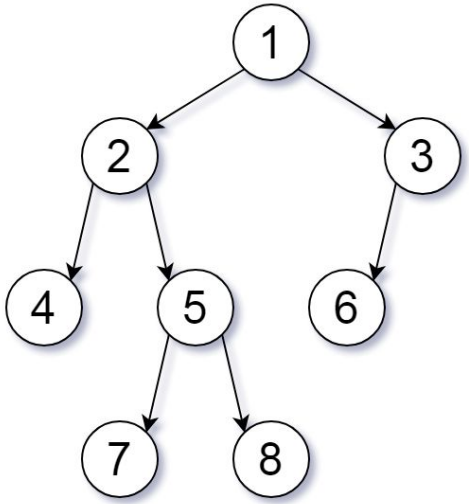


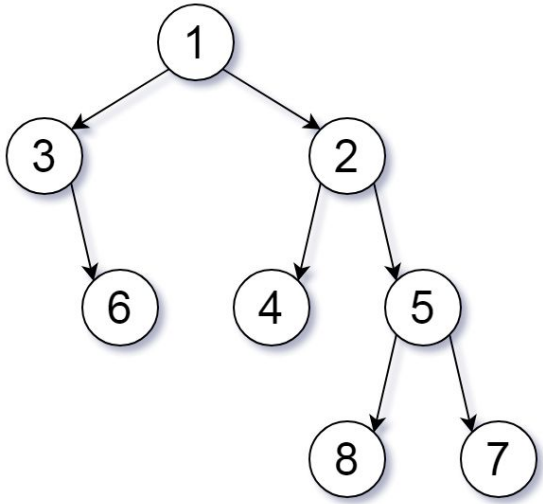
Problem #1: Symmetric Tree

- Given a tree, develop 2 methods
  - 1) Based on recursion to compare subtrees together
    - bool is_mirror(BinaryTree* first, BinaryTree* second)
  - 2) Based on parenthesize a tree then compare the left & right branches directly
- What is your time complexity?

Problem #2: Flip Equivalent Binary Trees

- bool is_flip_equiv(BinaryTree* other)
- Given a tree, can we make some swappings to some left/right children to convert it to another tree?

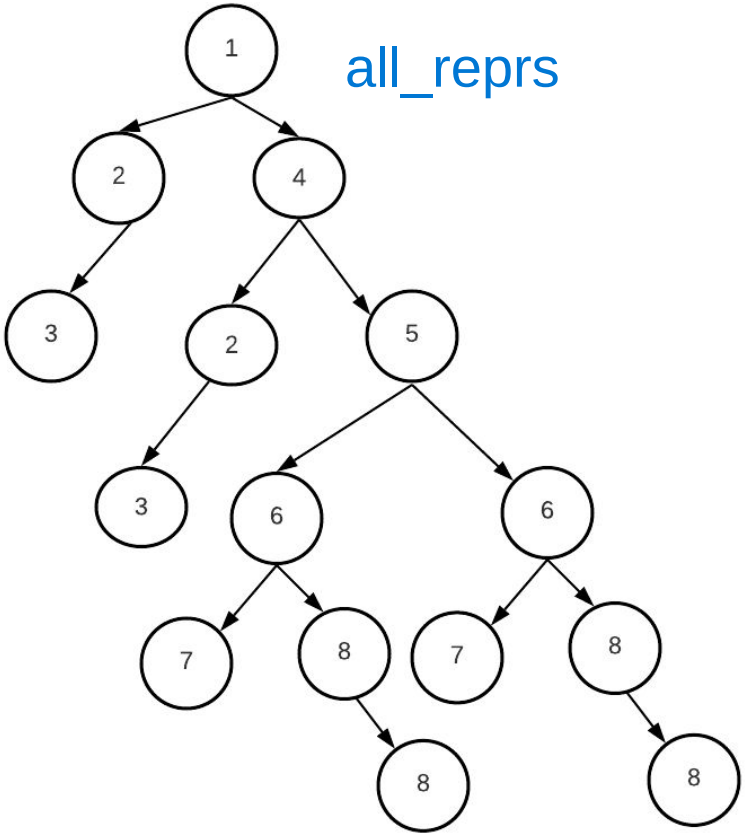




Img src

Problem #3: Print all duplicate subtrees

- Given a binary tree, print all duplicate subtrees of 2+ nodes.
  - Duplicates = Same structure & values
- There are 3 sub-trees
  - Root 2, Root 6, Root 8
- Output parentheses
  - (2(3()())())
  - (6(7()())(8()(9()())))
  - (8()(9()()))



all_reprs

"Acquire knowledge and impart it to the people."

"Seek knowledge from the Cradle to the Grave."