Trees - connected graph with no cycle or self loops

Tree

Not tree

Not true

Not tree

Tree
Rooted tree

- special vertex is called root
- \( \forall u, v \in E \), \( u \) closer to root than \( v \) \( \implies u \) is "parent" of \( v \);
- \( v \) is "child" of \( u \).
- Distance 1 = children of root
- Leaves = nodes without children
Q: Consider family tree. If I am the root, which nodes are child nodes of me?

A) My children  B) My Parents  C) Children & Parents

![Family Tree Diagram]

**def**: An *k*-ary tree is a rooted tree where every node has at most *k* children.

Most Famous in Computer Science: Binary Tree  
2-ary tree.

Applications:  
* Data structures  
* Codes