

Discrete Structures

Fight for Survival

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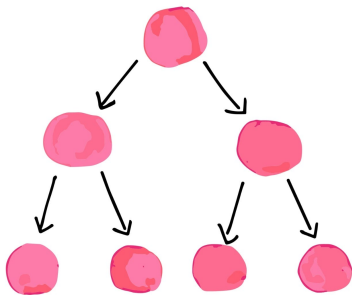
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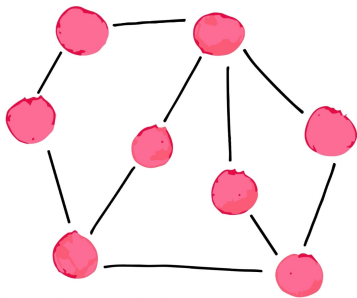
Introduction to Trees

A **graph** can be connected or disconnected, can have cycles or loops, and does not necessarily have a root node.

A **tree** is a type of graph that is connected, acyclic (meaning it has no cycles or loops).



TREE

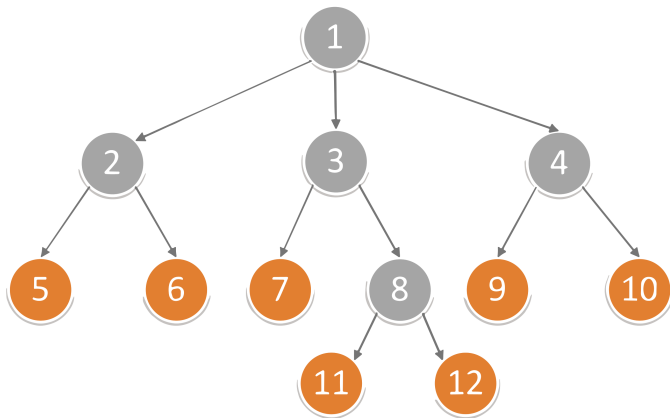


GRAPH

Properties of Trees

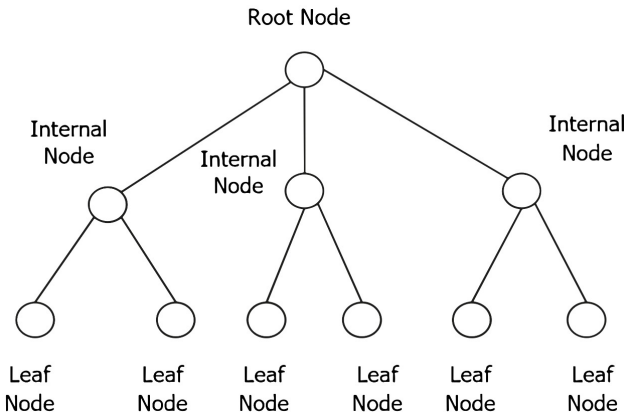
A tree with n vertices has $n-1$ edges.

- The given tree has 12 vertices and $12 - 1 = 11$ edges.



Rooted Trees

A rooted tree is a connected acyclic graph with a special node that is called the root of the tree and every edge directly or indirectly originates from the root.



Rooted Trees

Think?

1. How many non-isomorphic unrooted trees are there with three vertices?
2. How many non-isomorphic rooted trees are there with three vertices?



Prefix Code Tree

A prefix code tree is a rooted tree such that:

- each edge is labeled by a bit.
- each leaf denoted by a character.
- The codeword for the character is based on the labels on the root-to-leaf path.

$A \rightarrow 0$, $B \rightarrow 100$, $C \rightarrow 101$, $D \rightarrow 110$, $E \rightarrow 111$

