CMPT 225 - Rooted Trees

Terminology

- Graph
    - a pair with vertices and nodes
    - G{V, E}
    - V is a set of vertices
    - E is the set of connected vertices (edges)
    - Can be directed or undirected (for us, by default is undirected)
- Path
    - A sequence of vertices
- Simple Path
    - All verices are distinct
- Connected
    - Every vertex can be reached by any other vertex
- Cycle
    - {V0, ... , Vn} where V0 equals Vn
- Simple cycle
    - A cycle that is a simple path; no repeated vertices
- Tree
    - A connected, acyclic graph
- Fact: every tree has n-1 edges

Rooted Tree Terminology

Rooted Tree

- we distinguish one node as the "root"
- The root can induce a direction on the edges (usually towards the root)
- Relations:
    - Parent
    - Siblings
    - Ancestors
    - Descendents

Note: leafs do not have children, and the root does not have a parent

A rooted tree is K-ary if no node has more than k children
A rooted tree is binary if no node has more than 2 children
Ordered if the children of every node are ordered.

Depth of V: the length of the path from V to the root.
Height of V: length of longest path from V to a descendent of V

- Height of tree T:
    - The height is its root.
    - The max height of any node in T
    - The max depth of any node in T

Subtree rooted at V: tree with root V and containing all descendents of V
left subtree: the subtree of the left node
right subtree: the subtree of the right node