Assignment 1

Shreshta Thumati - EE18BTECH11041

Download all latex-tikz codes from

https://github.com/Shreshta126/EE4013−C−and−
DS/tree/main/assignment_1/codes

1 PROBLEM

Let T be a tree with 10 vertices. What is the sum of degrees of all the vertices in T?

2 SOLUTION

Definition: In any graph, the degree **deg(v)** of a vertex **v** if defined as the the number of edges that have **v** as the endpoint.

The **degree sum formula** states that, given a graph **G = (V,E)**

$$\sum_{v \in V} \deg(v) = 2|E|. \qquad (2.0.1)$$

Proof: When two vertices are connected in a graph, degree increases by 1 for both the vertices and sum of degrees increases by 2. Which implies introducing an edge increases the sum of degrees by 2. Hence *sum of degree = 2|E|.*

The above formula is another form of **Handshaking lemma**.The lemma states that in any undirected graph, the number of vertices with odd degree is even.
A tree is also a graph with no loops. A tree with **n** vertices will have **n-1** edges. So *sum of degrees of the vertices* will be **2(n-1)**.

Given a tree with 10 vertices, number of edges will be equal to 9. Therefore, sum of degrees of the vertices will be equal to 18.

Code for obtaining the sum of degrees of vertices in a tree with n vertices:
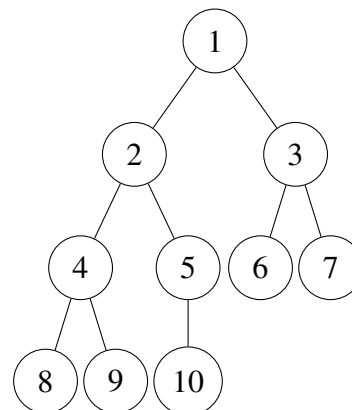
/codes/ee18btech11041.c

Fig. 0: Binary Tree