CSE2403-Discrete Mathematics

Problem Sheet-5

Topic: **Graph Theory** Subject Instructor : **Suresh Badarla**

Date: 23-05-2022

1. Prove that an undirected graph is a tree *iff* there is a unique simple path between every pair of vertices.

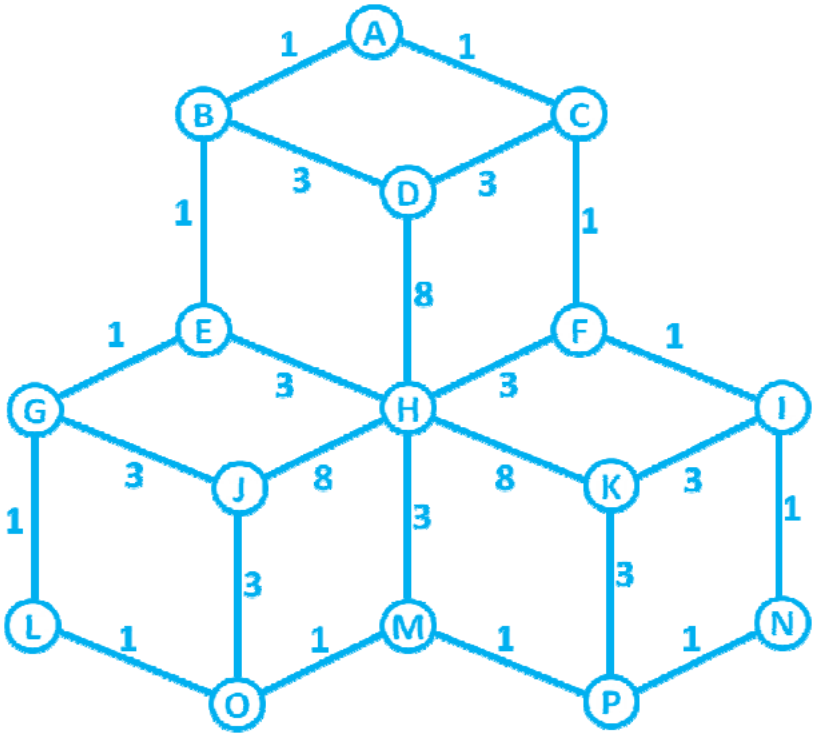
2. Prove that a tree with n vertices has (n-1) edges.

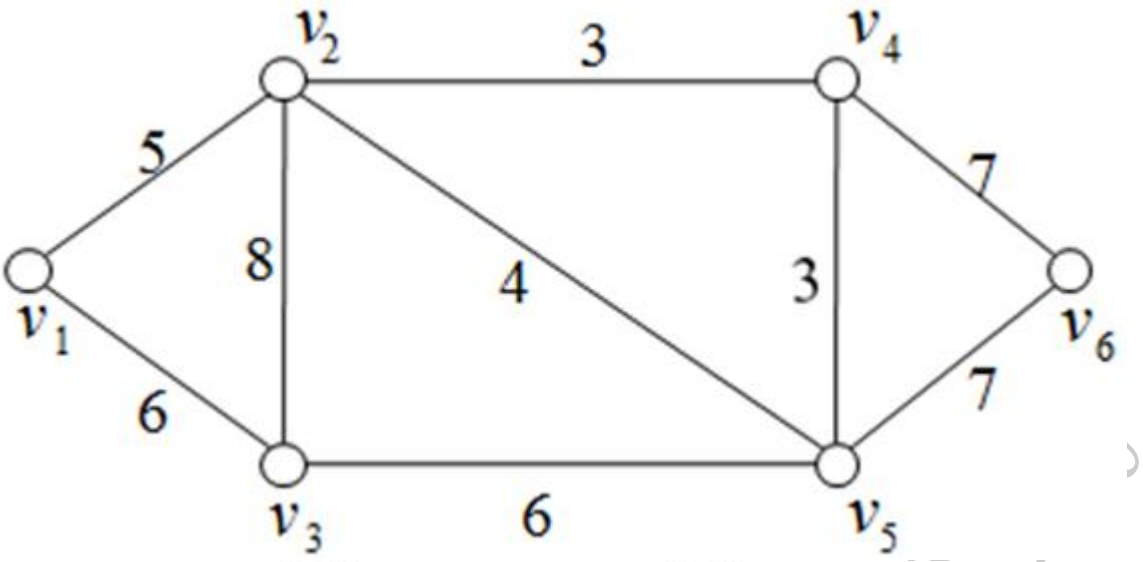
3. Prove that any connected graph with n vertices and (n-1) edges is a tree.

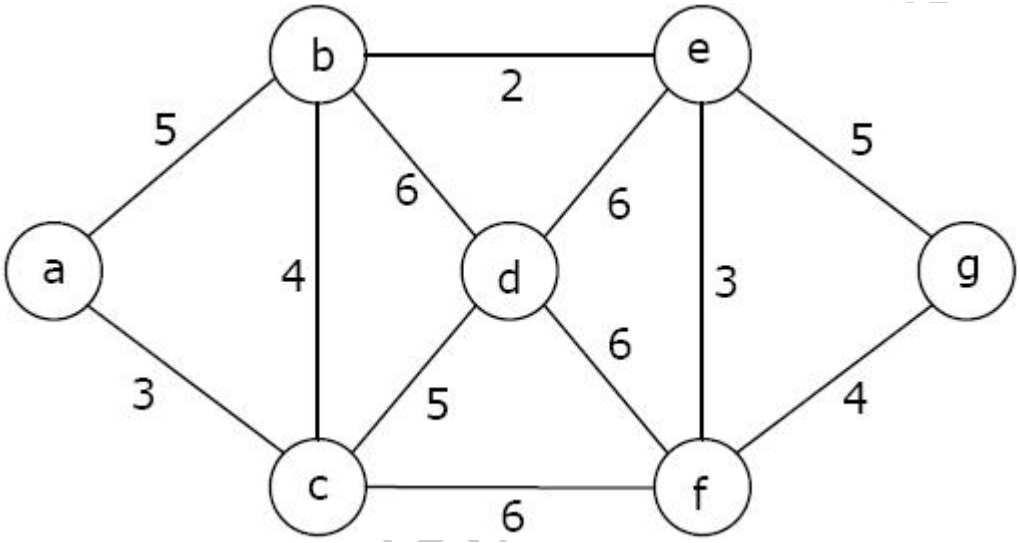
4. Prove that any acyclic graph with n vertices and (n-1) edges is a tree.

5. The number n of vertices of a full binary tree is odd and the number of pendant vertices of the tree is equal to $\frac{(n+1)}{2}$.

6. Find a minimum spanning tree for the weighted graphs shown in the below, by using Kruskal's algorithm.




v_1
v_2
v_3
v_4
v_5
v_6
5
3
7
8
4
3
6
7
6


a
b
c
d
e
f
g
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2
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6
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3
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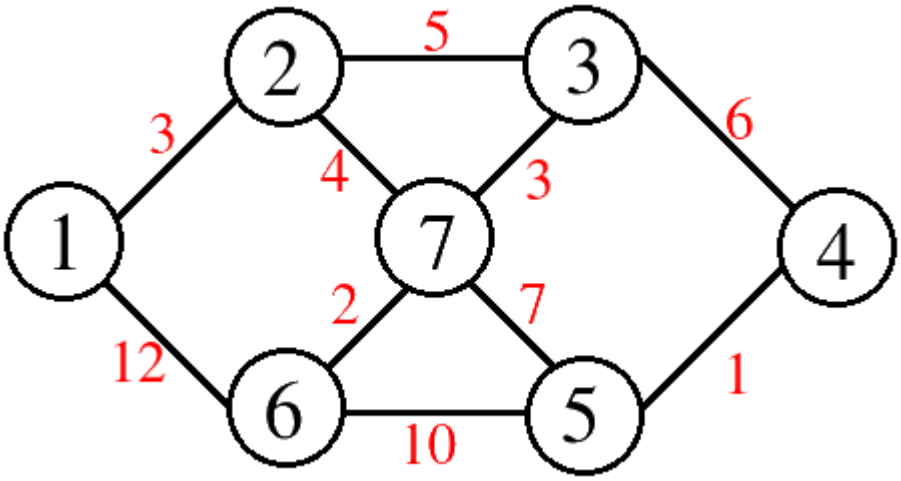
1
2
3
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5
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7
5
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4
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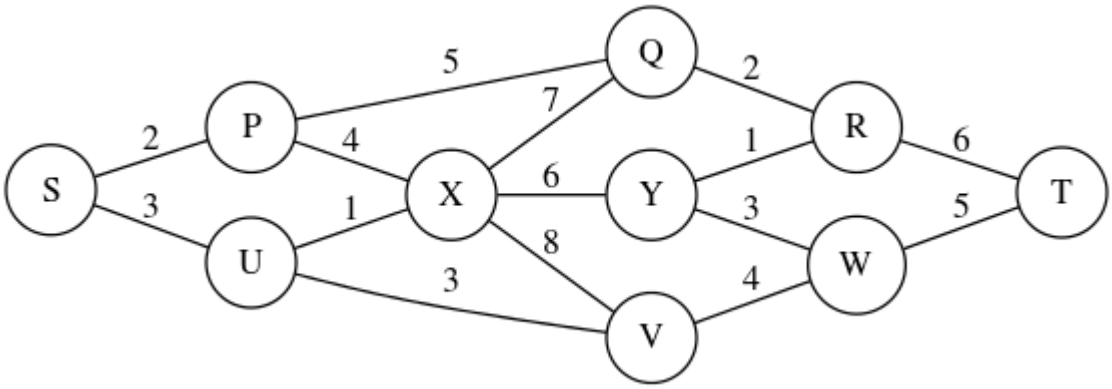
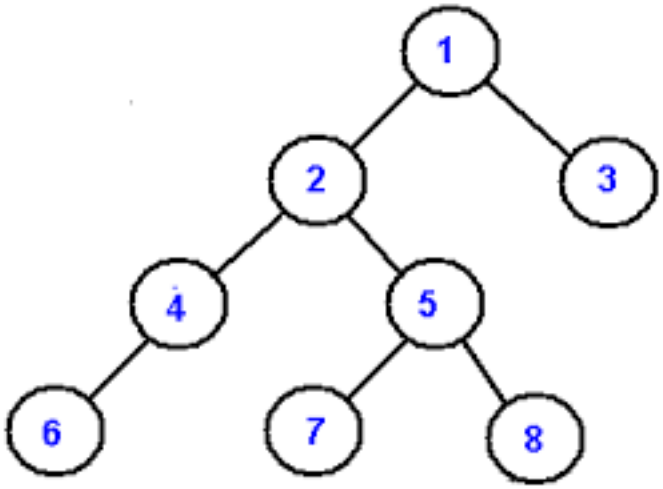
2
7
12
1
10



7. Construct the binary tree whose inorder and preorder traversal are respectively 5,1,3,9,6,8,4,2,7 and 6,1,5,9,3,4,8,7,2.

8. List the order in which the vertex of the binary tree shown in the figure are Processed using preorder, inorder and postorder traversals.



9. Draw a graph with 5 vertices A, B, C, D, E, such that $d(A) = 3$, B is an odd degree vertex, $d(C) = 2$ and D and E are adjacent.

10. Does there exists a simple graph with 5 vertices of the given degrees? If so draw such graph.
    (a) 1, 2, 3, 4, 5
    (b) 1, 2, 3, 4, 4
    (c) 3, 4, 3, 4, 3
    (d) 0, 1, 2, 2, 3
    (e) 1, 1, 1, 1, 1