

Assignment 3 Discrete Structure (SECI 1013)

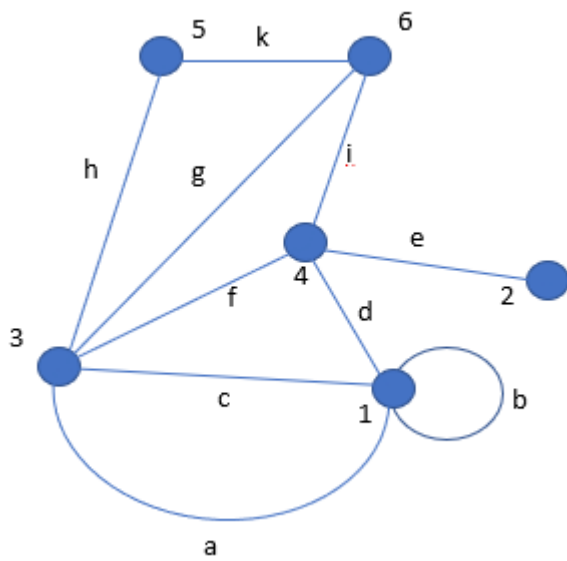
Graph and Tree

Question 1

Draw the graph based on the following adjacency matrix:

$$A_G = \begin{matrix} & \begin{matrix} 1 & 2 & 3 & 4 & 5 \end{matrix} \\ \begin{matrix} 1 \\ 2 \\ 3 \\ 4 \\ 5 \end{matrix} & \begin{bmatrix} 0 & 1 & 1 & 1 & 0 \\ 1 & 0 & 0 & 1 & 0 \\ 1 & 1 & 0 & 0 & 1 \\ 1 & 1 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 \end{bmatrix} \end{matrix}$$

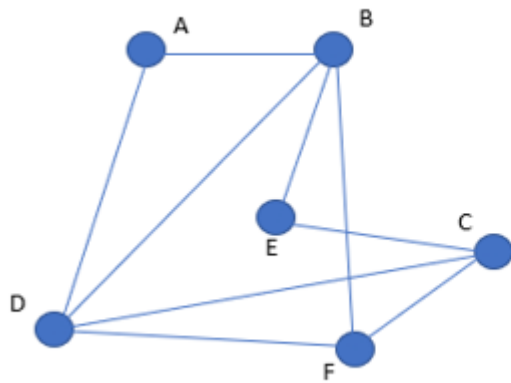
Question 2



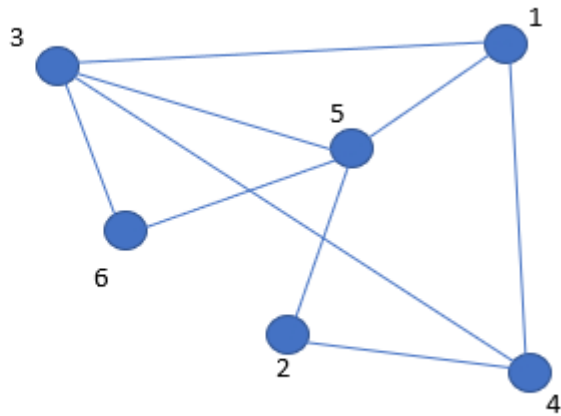
Given the graph shown above, Find:

- I. Incidence Matrix
- II. Adjacency Matrix

Question 3



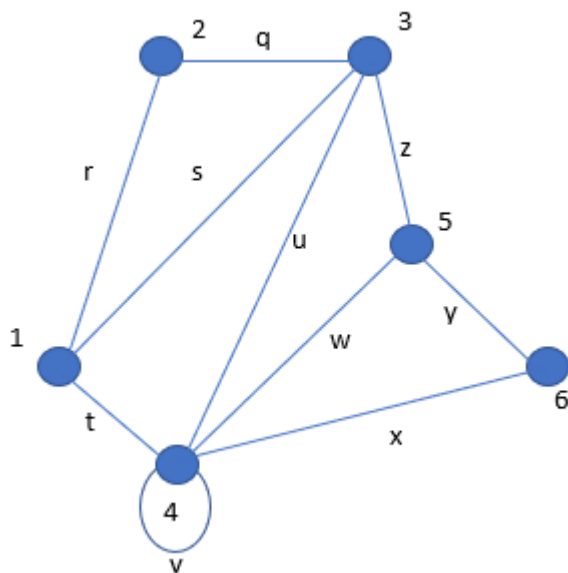
Graph Y



Graph Z

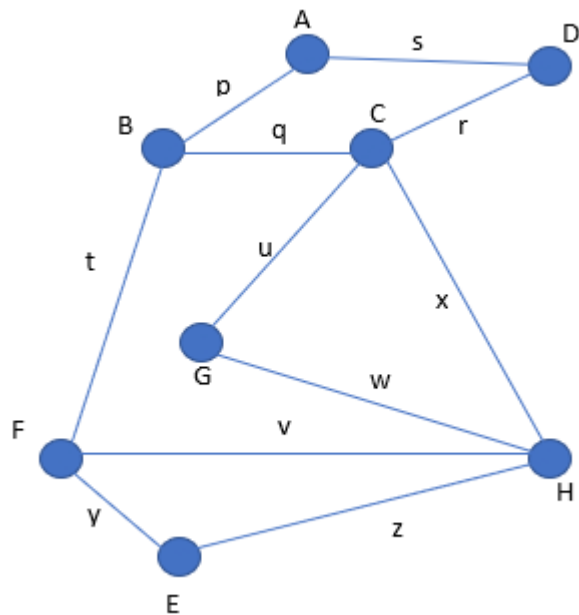
Determine whether Graph Y and Z above are isomorphic. If it is proven isomorphic, find their adjacency matrix.

Question 4



Determine whether the graph above has an Euler circuit or Euler trail. Show and prove why is it Euler circuit or Euler Trail.

Question 5



Determine whether the graph above has Hamiltonian circuit. Show and prove your answer.

Question 6

Represent $(A \cap B) - (A \cup (B - A))$ using an ordered rooted tree. Then write this expression in

- a) Prefix notation
- b) Postfix notation
- c) Infix notation

Question 7

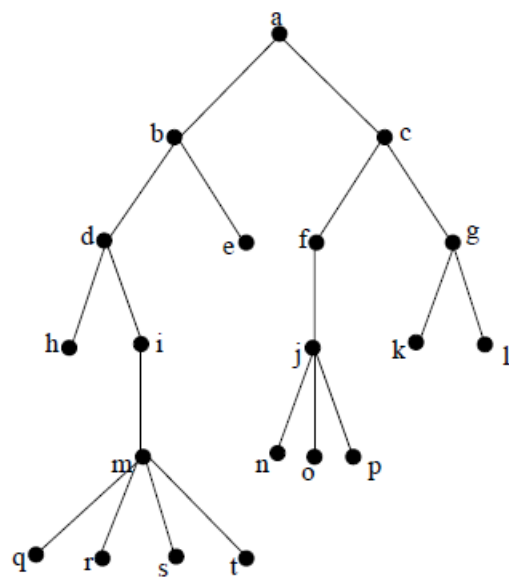
Given an arithmetic equation in prefix notation below:

$$*/\ 9\ 3\ +* 2\ 4 - 7\ 6$$

- a) Draw the ordered rooted tree
- b) Write each expression using infix notation
- c) Find the value for this arithmetic equation

Question 8

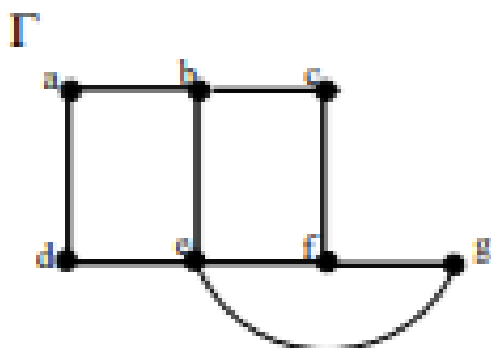
Given the rooted tree below, answer the questions below



- List the children of vertex j
- List the ancestor of vertex s
- List the siblings of vertex q
- Find the number of leaves in this rooted tree
- List all level 3 vertices in this rooted tree
- Find the least m for which this tree is a rooted m -ary tree
- Find the height of this rooted tree
- Find the postorder and inorder traversal for this rooted tree

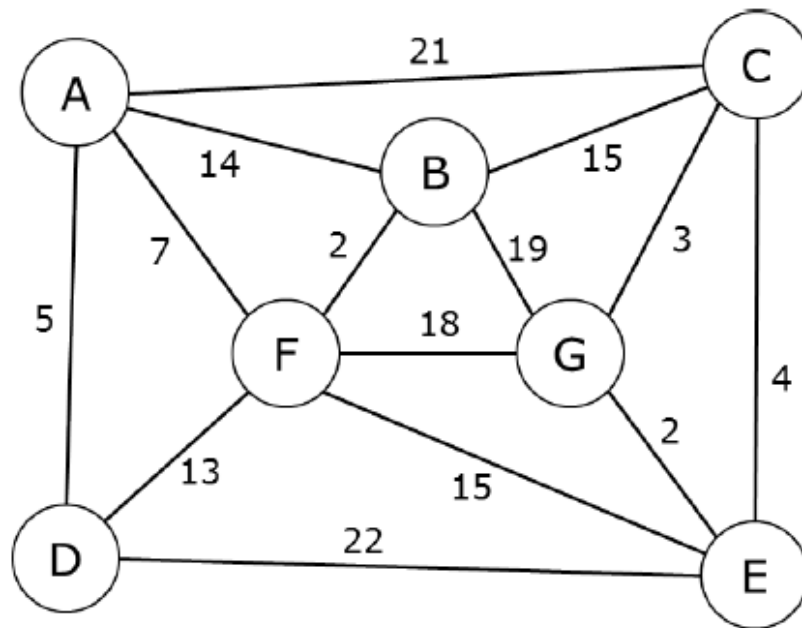
Question 9

Given the tree below, draw 5 possible spanning trees for the following graph



Question 10

Find the minimum spanning tree for the Figure 2 using Kruskal Algorithm.



Question 11

- How many edges does a full 5-ary tree with 121 leaves have?
- How many vertices does a full 7-ary tree with 121 internal vertices have?
- T is a binary tree of height 3. What is the largest and smallest number of nodes that T can have?
- The futsal tournament follows a single-elimination format in which a team is eliminated after one loss. Suppose the results of the tournament are represented in a binary tree. If the tournament is limited to only 5 rounds of games to determine the winner, how many teams can be registered for the tournament and how many matches need to be scheduled by the organizer?

Question 12

Based form graph in Figure 5, complete Table 1 by tracing Dijkstra Algorithm to obtain shortest path between adjacent nodes

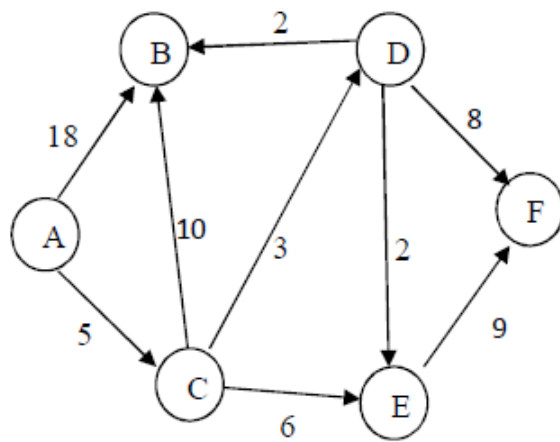


Figure 5

- What is the shortest path from node *A* to node *F*.
- State the path that contributes to the minimum distance.