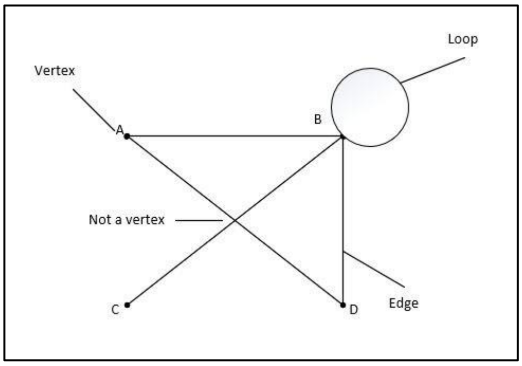
GRAPH TERMINOLOGY



SUMMARY OF GRAPH TERMINOLOGY IN GRAPH THEORY

The **size** of a graph is the number of its edges.

The **degree of a vertex** written $deg(v)$ is equal to the ***number of edges*** which are incident on v

The **sum of the degrees** of the vertices of a graph is equal to ***twice the number of edges***

The vertex v is said to be **even or odd (parity)** according as $deg(v)$ is even or odd

A vertex v is **isolated** if it is does not belong to any edge

A vertex with degree 1 is called a **leaf vertex**

The incident edge of vertex with degree 1 is referred as a **pendant edge**

A **path** is the sequence of connected vertices.

A **simple path** is a path where the vertices are only passed through once

A **trail** is a path where each edge is traveled once, meaning that there are no repeated edges (all edges are distinct)

The **length** of the path is the number n of edges that it contains

The **distance** between two vertices is described by the length of the shortest path that joins them

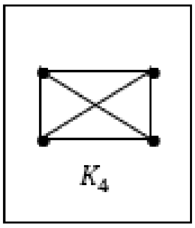
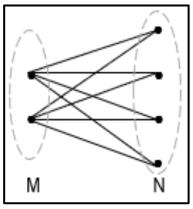
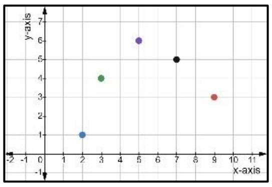
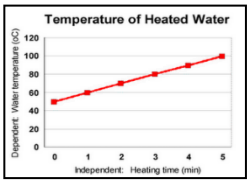
A **cycle / simple cycle** is a closed path with at least 3 edges, and no repeated vertices and

An **acyclic** is a graph that has no cycles in it

A **closed path or circuit** is a path that starts and ends at the same vertex

A graph is called **planar** if it can be drawn in the plane without any edges crossing each other

TYPE OF GRAPH

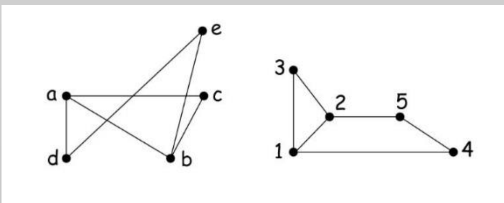
COMPLETE GRAPH	BIPARTITE GRAPH	DISCRETE GRAPH	LINEAR GRAPH
			

ISOMORPHIC GRAPH

Two or more graphs are isomorphic if they have the same:

- Number of vertices
- Number of edges
- Degree for each distinct vertices
- The graphs have bijective function

Example of isomorphic graphs:



GRAPH G GRAPH H

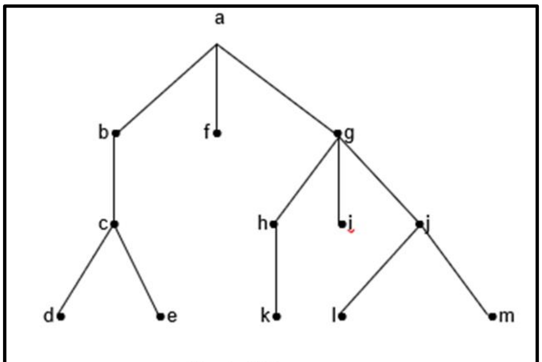
Determine whether the graphs above are isomorphic or not?

Step		Graph G		Graph H	
1.	No. of vertices	5		5	
2.	No. of edges	6		6	
3.	Degree of vertex	Deg(a)	3	Deg(1)	3
		Deg(b)	3	Deg(2)	3
		Deg(c)	2	Deg(3)	2
		Deg(d)	2	Deg(4)	2
		Deg(e)	2	Deg(5)	2
4.	Illustrate the graph G & H to ensure it have bijective function! f(a)=1 f(b)=2 f(c)=3 f(d)=4 f(e)=5				

EULER PATH, EULER CIRCUIT, HAMILTON PATH, HAMILTON CIRCUIT

- **Euler path -** A connected multigraph has an **Euler path** if and only if it has **exactly two vertices of odd degree**.
- **Euler Circuit-** A connected multigraph has an **Euler circuit** if and only if **every vertex have even degree.**
- **Hamilton path-** A **Hamilton path** is a simple path in a graph G that **passes through every vertex exactly once.**
- **Hamilton Circuit-** A **Hamilton circuit** is a simple circuit in a graph G that **passes through every vertex exactly once.**

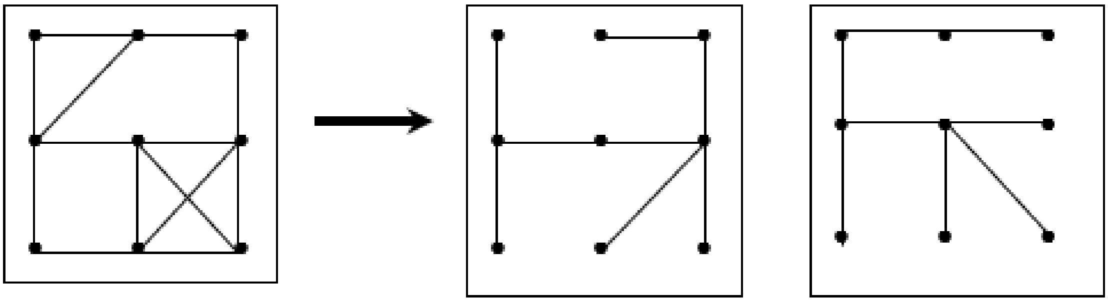
EXAMPLE OF TREES



A Rooted Tree

- The **root** is **a**.
- The **parent of h,i** and **j** is **g**.
- The **children of b** is **c.** The **children of j** are **l** and **m.**
- **h, i** and **j** are a **sibling**.
- The **ancestor of e** are **c, b** and **a**.
- The **descendants** of **b** are **c, d** and **e.**
- The **internal vertices** are **a, b, c, g, h** and **j.** (vertices that have children)
- The **leaves** are **d, e, f, i, k, l** and **m.** (vertices that have no children)

SPANNING TREES



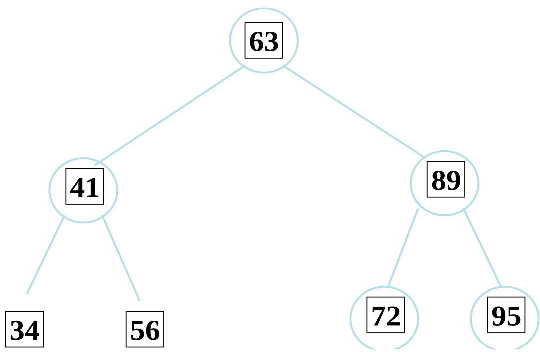
MINIMAL SPANNING TREES

- **PRIM'S ALGORITHM**
- **KRUSKAL ALGORITHM**

EXAMPLES OF BINARY SEARCH TREE

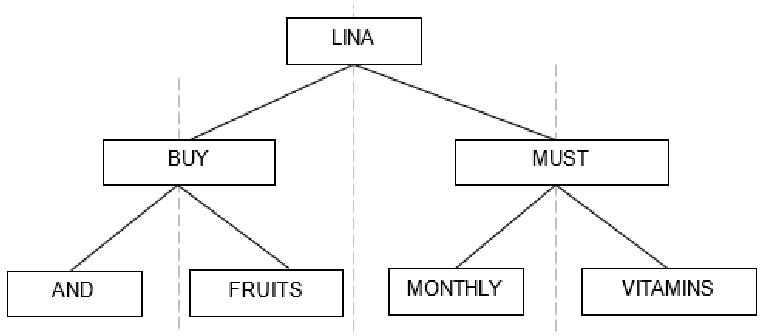
Example 1:

Construct a BST from set of data 63 89 72 41 56 95 34.



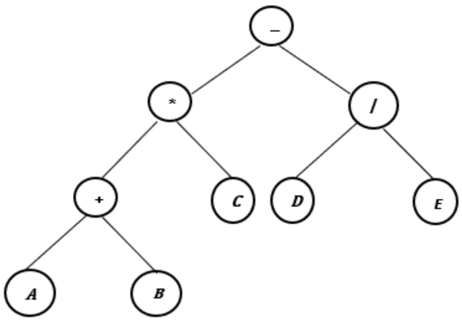
Example 2:

Construct a BST from the words “LINA MUST BUY FRUITS AND VITAMINS MONTHLY”.



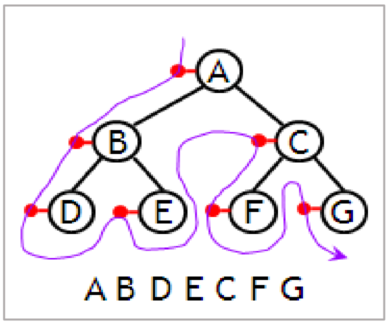
Example 3:

Construct a BST for the given arithmetic expression: $(A + B) * C - D/E$



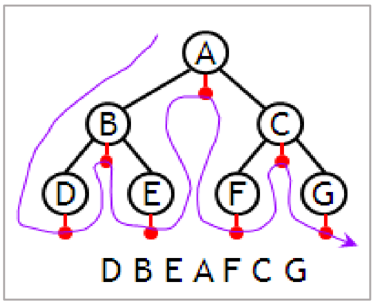
ORGANIZE TREE TRAVERSALS

PRE- ORDER TRAVERSAL:



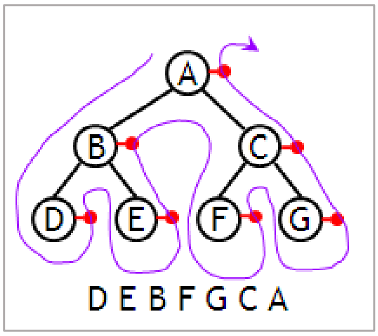
Pre-order: **A, B, D, E, C, F, G**

IN- ORDER TRAVERSAL:



In-order: **D, B, E, A, F, C, G**

POST- ORDER TRAVERSAL



Post-order: D. E. B. F. G. C. A