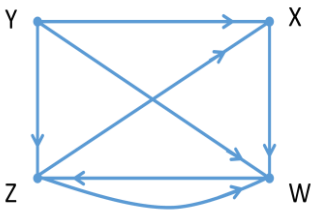
Assignment
on
Tree and Graph

1. Write a program to create a binary search tree for N given data items as input (A binary search tree is a rooted binary tree, whose internal nodes each stoke a key (and optionally, an associated value) and each have two distinguished sub-trees, commonly denoted left and right. The tree additionally satisfies the binary search tree property, which states that the key in each node must be greater than or equal to any stored in the left sub-tree, and less than or equal to any stored in the right sub-tree). Your program also performs the following operations on the binary search tree:
    - Traverse the tree in
        - pre-order
        - in-order
        - post-order
    - Search the tree for a given key value and return "Yes" if the search is successful and "No" otherwise.
    - Insert a key which will be placed at an appropriate place.
    - Calculate the path length of the given tree.

2. Suppose you are given graph G in the form of adjacency matrix. Write a program to determine the path matrix using Warshall's Algorithm.

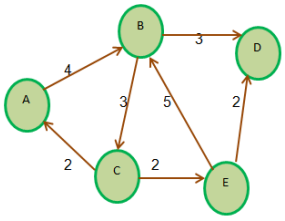
    Example: For the graph:



Adjacency Matrix is:	Path Matrix is:
$A = \begin{array}{c} \\ X \\ Y \\ Z \\ W \end{array} \begin{array}{c} \begin{array}{cccc} X & Y & Z & W \end{array} \\ \begin{pmatrix} 0 & 0 & 0 & 1 \\ 1 & 0 & 1 & 1 \\ 1 & 0 & 0 & 1 \\ 0 & 0 & 1 & 0 \end{pmatrix} \end{array}$	$P = \begin{array}{c} \\ X \\ Y \\ Z \\ W \end{array} \begin{array}{c} \begin{array}{cccc} X & Y & Z & W \end{array} \\ \begin{pmatrix} 1 & 0 & 1 & 1 \\ 1 & 0 & 1 & 1 \\ 1 & 0 & 1 & 1 \\ 1 & 0 & 1 & 1 \end{pmatrix} \end{array}$

3. Suppose you are given graph G in the form of weight matrix. Write a program to determine the shortest path of the graph.

Example: For the graph:



The weight matrix is:

	A	B	C	D	E
A	0	4	0	0	0
B	0	0	3	3	0
C	2	0	0	0	2
D	0	0	0	0	0
E	0	5	0	2	0

Shortest path from A to D is: A -> B -> D