Assignment 4

Question1.
Implement a binay search tree data structure given the inorder and preorder seqences as the input. In the second line of the input you will be given a value which is present in the tree. Now write a function to root the tree at the node corresponding to the given value. (Use rotations) print the 3 traversal sequences of the resulting binary tree.
Input format:
A number of N which represents the number of elements to be entered.
Preorder Sequence
Inorder Sequence
Root value
Output:
Inorder Traversal
Preorder Traversal
Postorder Traversal

Question2.
A Cartesian tree of n numbers is a binary tree that is defined as follows.

The root of the tree is the smallest element of the n numbers. The left subtree of the root is a Cartesian tree of the elements before the smallest element and the right subtree of the root is a Cartesian tree of the elements after the smallest element. For instance, if the numbers are 5 4 1 2 6, then the root is 1, the left subtree is a Cartesian tree of elements 5 4 and the right subtree is a Cartesian tree of elements 2 6.

Write a program that takes n numbers as input and builds a Cartesian tree of the input. As output, produce the preorder and postorder traversals of the resulting Cartesian tree.

Input format:
The number of numbers in tree(N)
N numbers to be inserted in tree

Question3.
In an undirected graph G, a connected component is a maximal connected subgraph of G. Let us call the number of nodes present in each subgraph as a the size of the connected component. Given a graph, report the size of the largest connected component.
The input graph G is given as an adjacency matrix with the first line containing number of vertices.

Question4.Dijkstra Problem
The holiday season starts tomorrow and Larry, the owner of 'Monk's Cafe' wants to decorate his coffee shop to keep up with the festive spirit. He has told his employees, Kelly and Ruthie to report early tomorrow morning and set up the decorations.

Kelly is not very excited about this and decides that she would arrive after Ruthie so that she has to work less. She also wants to arrive before Monk so that she does not get caught. Since she likes driving, she decides to take the second shortest path from her house to the shop.

The city consists of R bidirectional roads, each linking two of the N intersections, conveniently numbered from 1 to N. Kelly starts at intersection 1, and the coffee shop is at intersection N.

The second-shortest path may share roads with any of the shortest paths, and it may backtrack i.e., use the same road or intersection more than once. The second-shortest path is the shortest path whose length is longer than the shortest path(s) (i.e., if two or more shortest paths exist, the second-shortest path is the one whose length is longer than those but no longer than any other path).

Input

Input starts with an integer $1 \le T \le 4$, denoting the number of test cases.

Each case contains two integers N ($1 \le N \le 5000$) and R ($1 \le R \le 100000$). Each of the next R lines contains three space-separated integers: u, v and w that describe a road that connects intersections u and v and has length w ($1 \le w \le 5000$). It is possible for the graph to contain loops and multiple edges between pair of vertices. It may also have self-loops.

Output

For each case, if the destination is connected to the source, print the second best shortest path as described above. Otherwise, print -1.