

APS Assignment 4

A : Biryani at THE PARADISE

As everyone in IIIT is busy with assignments ,deadlines and eagerly waits for weekend to relax. So on one sunday Shivam Soni called his friend Pankaj kumar to meet up for Birayani at "The Paradise" and explore the Hyderabad city,which is in the structure of binary tree. The hyderabad city is divided in different zones which are distinct and there exists a path from each zone to the other zone. pankaj and Shivam decided to meet at the nearest common point that is joining the zones in which they are present.

Now given the city structure you need to help them finding the nearest common zone to meet for which the total distance covered by them would be minimal. the only constraint is that they both can go only towards root zone.

Input:

The city structure is in the form of a Binary Tree.

First line contains the number of zones N.

Second line contains the preorder of the city.

Third line contains the inorder of the city.

Next line contains number of queries Q.

Next Q lines contain 2 zones.

Output:

Each of the Q number of lines contains the nearest zone to meet.

Sample Test Case:

Input:

5

3 1 5 4 2

1 4 5 3 2

10

4 1

1 2

2 2

2 1

1 2

2 3

3 2

2 1

1 1

1 4

Output:

1

3

2

3

3

3
3
3
1
1

Constraints:

$1 \leq N \leq 100000$

$1 \leq Q \leq 100$

Time Limit: 1 sec

B : Non- Recursive Traversal of BST

Given a preorder traversal of Binary Search Tree, Print Inorder, Postorder and LevelOrder Traversal of the same without using recursion.

Input:

First Line will contain an Integer N ($1 \leq N \leq 5000$), the number of nodes in a BST.

Second Line will have N integers separated by space which represents the Preorder Traversal of the tree.

Output:

First Line would have N integers separated by space representing Inorder Traversal.

Second for Postorder traversal

Third for LevelOrder traversal

Sample test case:

Input:

9

8 3 1 6 4 7 10 14 13

Output:

1 3 4 6 7 8 10 13 14

1 4 7 6 3 13 14 10 8

8 3 10 1 6 14 4 7 13

Note: There is a space after last element of the output traversal

C : motorcycle diaries - revisited !

Long ago there was a country called BST where only great computer scientists used to live.

It was a strange country and the states of this country were assigned unique numbers and were arranged in a binary search tree. People in that country used to follow a strange law which was as below:

Only 2 new persons were allowed to enter the country.

And the newly entered persons will be kept as far from each other as possible.

One day, Che Guevara and Alberto Granado went to BST and were sent to two farthest states following the law.

Now you need to determine the distance between Che Guevara and Alberto Granado.

Note: the distance between two connected states is one unit.

Input:

First line contains one number N ($2 \leq N \leq 5000$), total number of states in BST

Next line will contain N integers (unique number for a state), separated by space, which represents pre-order traversal of BST

Output:

Print the answer, which represents the distance between two farthest nodes of given BST, in a single line followed by a '\n' (just print a new line, no need to display '\n').

Sample test case:

Input:

9

8 3 1 6 4 7 10 14 13

Output:

6

Explanation:

Maximum possible distance is 6, which is when one (Che/Granado) is in 13 and the other is either in 4 or in 7.