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# Check for Identical BSTs without building the trees

Given two arrays which represent a sequence of keys. Imagine we make a Binary Search Tree (BST) from each array. We need to tell whether two BSTs will be identical or not without actually constructing the tree.

#### Examples

For example, the input arrays are {2, 4, 3, 1} and {2, 1, 4, 3} will construct the same tree

```
Let the input arrays be a[] and b[]
Example 1:
a[] = \{2, 4, 1, 3\} will construct following tree.
   2
1
   3
b[] = \{2, 4, 3, 1\} will also also construct the same tree.
   2
1
   3
So the output is "True"
Example 2:
a[] = \{8, 3, 6, 1, 4, 7, 10, 14, 13\}
```

```
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```
b[] = {8, 10, 14, 3, 6, 4, 1, 7, 13}
They both construct the same following BST, so output is "True"
       3
               10
     / \
```

#### Solution:

#include<stdio.h>

According to BST property, elements of left subtree must be smaller and elements of right subtree must be greater than root.

Two arrays represent sane BST if for every element x, the elements in left and right subtrees of x appear after it in both arrays. And same is true for roots of left and right subtrees.

// A C program to check for Identical BSTs without building the trees

The idea is to check of if next smaller and greater elements are same in both arrays. Same properties are recursively checked for left and right subtrees. The idea looks simple, but implementation requires checking all conditions for all elements. Following is an interesting recursive implementation of the idea.

```
#include<limits.h>
#include<stdbool.h>
/* The main function that checks if two arrays a[] and b[] of size n c
 same BST. The two values 'min' and 'max' decide whether the call is
 left subtree or right subtree of a parent element. The indexes il an
 the indexes in (a[] and b[]) after which we search the left or right
 Initially, the call is made for INT MIN and INT MAX as 'min' and 'ma:
 respectively, because root has no parent.
 il and il are just after the indexes of the parent element in a[] and
bool isSameBSTUtil(int a[], int b[], int n, int i1, int i2, int min, i:
  int j, k;
  /* Search for a value satisfying the constraints of min and max in
     b[]. If the parent element is a leaf node then there must be some
     elements in a[] and b[] satisfying constraint. */
```



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```
for (j=i1; j<n; j++)
       if (a[j]>min && a[j]<max)</pre>
           break;
   for (k=i2; k<n; k++)
       if (b[k]>min && b[k]<max)</pre>
           break;
   /* If the parent element is leaf in both arrays */
   if (j==n \&\& k==n)
       return true;
   /* Return false if any of the following is true
      a) If the parent element is leaf in one array, but non-leaf in o
      b) The elements satisfying constraints are not same. We either so
         for left child or right child of the parent element (decinded
         and max values). The child found must be same in both arrays
   if (((j==n)^(k==n)) || a[j]!=b[k])
       return false;
   /* Make the current child as parent and recursively check for left
      subtrees of it. Note that we can also pass a[k] in place of a[j]
      are both are same */
   return isSameBSTUtil(a, b, n, j+1, k+1, a[j], max) && // Right Sub
          isSameBSTUtil(a, b, n, j+1, k+1, min, a[j]);
                                                         // Left Subt
// A wrapper over isSameBSTUtil()
bool isSameBST(int a[], int b[], int n)
   return isSameBSTUtil(a, b, n, 0, 0, INT MIN, INT MAX);
// Driver program to test above functions
int main()
   int a[] = {8, 3, 6, 1, 4, 7, 10, 14, 13};
   int b[] = {8, 10, 14, 3, 6, 4, 1, 7, 13};
   int n=sizeof(a)/sizeof(a[0]);
   printf("%s\n", isSameBST(a, b, n)?
             "BSTs are same": "BSTs not same");
   return 0;
Output:
```

This article is compiled by **Amit Jain**. Please write comments if you find anything incorrect, or you want to share more information about the topic discussed above



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affiszerv Your example has two 4s on row 3, that's why it...

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Neha I think that is what it should return as, in...

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