Competitive practise questions
Linklist AND ARRAY -

MergeSort Linklist
http://practice.geeksforgeeks.org/problems/reverse-a-linked-list-in-groups-of-given-size/1
http://practice.geeksforgeeks.org/problems/detect-loop-in-linked-list/1

http://www.geeksforgeeks.org/flattening-a-linked-list/
http://practice.geeksforgeeks.org/problems/add-two-numbers-represented-by-linked-lists/1
http://practice.geeksforgeeks.org/problems/delete-without-head-pointer/1
http://practice.geeksforgeeks.org/problems/linked-list-that-is-sorted-alternatingly/1
http://practice.geeksforgeeks.org/problems/multiply-two-polynomials-ii/1(Do Optimized Solution)
http://practice.geeksforgeeks.org/problems/merge-two-sorted-linked-lists/1
****** **http://practice.geeksforgeeks.org/problems/delete-without-head-pointer/1** ******
http://www.geeksforgeeks.org/sort-a-linked-list-of-0s-1s-or-2s/
http://practice.geeksforgeeks.org/problems/pairwise-swap-elements-of-a-linked-list-by-swapping-data/1
**** http://practice.geeksforgeeks.org/problems/length-of-longest-palindrome-in-linked-list/1 ****
http://practice.geeksforgeeks.org/problems/remove-loop-in-linked-list/1
http://practice.geeksforgeeks.org/problems/flattening-a-linked-list/1

STACK -

http://practice.geeksforgeeks.org/problems/sort-a-stack/1
http://practice.geeksforgeeks.org/problems/get-minimum-element-from-stack/1

- **http://practice.geeksforgeeks.org/problems/lru-cache/1 (Most Important)**

TODO -

http://practice.geeksforgeeks.org/problems/level-order-traversal-in-spiral-form/1
http://www.geeksforgeeks.org/print-nodes-top-view-binary-tree/
http://practice.geeksforgeeks.org/problems/exchange-the-leaf-nodes/1

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Problems:

Partition a set into two subsets such that the difference of subset sums is minimum
http://www.geeksforgeeks.org/partition-a-set-into-two-subsets-such-that-the-difference-of-subset-sums-is-minimum/

Find median in row wise sorted matrix
http://www.geeksforgeeks.org/find-median-row-wise-sorted-matrix/

Count number of bits to be flipped to convert A to B
http://www.geeksforgeeks.org/count-number-of-bits-to-be-flipped-to-convert-a-to-b/

Geek and its Colored Strings
http://practice.geeksforgeeks.org/problems/geek-and-its-colored-strings/0

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http://www.geeksforgeeks.org/paper-cut-minimum-number-squares-set-2/

ARRAY

https://www.geeksforgeeks.org/count-possible-decodings-given-digit-sequence/

KMP algorithm pattern repetition

- Kadane's algorithm
- leaders-in-an-array

Dutch-National Flag Algo
http://www.geeksforgeeks.org/three-way-partitioning-of-an-array-around-a-given-range/

Reverse array: (ArBr)r

http://www.geeksforgeeks.org/find-maximum-value-of-sum-iarri-with-only-rotations-on-given-array-allowed/

Max sum with rotations: sumarr - (n)arr[n-j]

http://www.geeksforgeeks.org/maximize-sum-consecutive-differences-

circular-array/

http://www.geeksforgeeks.org/sorted-subsequence-size-3-linear-time-using-constant-space/

*http://www.geeksforgeeks.org/largest-subarray-with-equal-number-of-0s-and-1s/

#https://practice.geeksforgeeks.org/problems/largest-subarray-with-0-sum/1

Dynamic Program and recursion

BEST=>https://www.geeksforgeeks.org/minimum-number-jumps-reach-endset-2on-solution/
Combination sum
Subset sum
Print subset
Print permutation of string
largest increasing Subsequence of array
edit distance

NOTE:

use stack for reverse or check palindrome
(fill stack and traverse and fill again if all pops out it is palindrome)

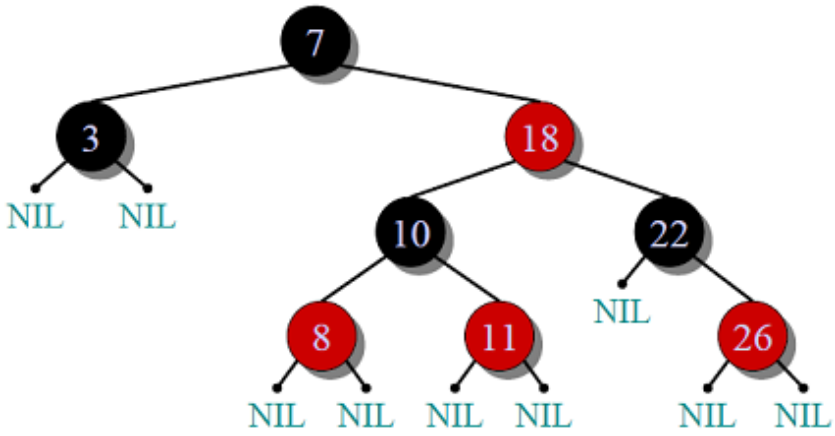
https://www.geeksforgeeks.org/write-a-function-to-get-the-intersection-point-of-two-linked-lists/
https://practice.geeksforgeeks.org/problems/check-if-linked-list-is-pallindrome/1

stack-next greater ele in array
find-a-tour-that-visits-all-stations

NOT DONE:
https://www.geeksforgeeks.org/dynamic-programming-set-28-minimum-insertions-to-form-a-palindrome/
rotten
Form a palindrome
box stack ques

Red-Black Tree | Set 1 (Introduction)

Red-Black Tree is a self-balancing Binary Search Tree (BST) where every node follows following rules.



1) Every node has a color either red or black.
2) Root of tree is always black.
3) There are no two adjacent red nodes (A red node cannot have a red parent or red child).
4) Every path from root to a NULL node has same number of black nodes.

TREES

INORDER SUCCESSOR OF BINARYTREE

Exchange the Leaf Nodes
Sum of the Longest Bloodline of a Tree
Remove Half Nodes
Leaves to DLL
Check if Tree is Isomorphic
***Vertical sum (Special Algo)**

http://www.geeksforgeeks.org/lowest-common-ancestor-in-a-binary-search-tree/
http://www.geeksforgeeks.org/diagonal-sum-binary-tree/

http://www.geeksforgeeks.org/diameter-of-a-binary-tree/
Serialize and Deserialize a Binary Tree

*****Diameter of tree**

Views of tree:

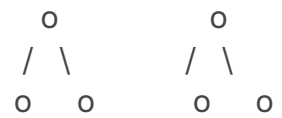
- [ ] https://www.geeksforgeeks.org/print-right-view-binary-tree-2/
- [ ] https://www.geeksforgeeks.org/print-nodes-top-view-binary-tree/
- [ ] https://www.geeksforgeeks.org/bottom-view-binary-tree/
- [ ] https://www.geeksforgeeks.org/print-left-view-binary-tree/
- [ ] https://www.geeksforgeeks.org/print-binary-tree-vertical-order/
- [ ] Diagonal Traversal of tree

1. Maximum sum path
2. Root to leaf paths sum
3. http://www.geeksforgeeks.org/find-maximum-path-sum-two-leaves-binary-tree/

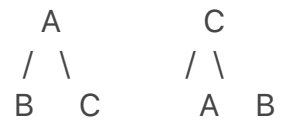
Enumeration of Binary Trees

A Binary Tree is labeled if every node is assigned a label and a Binary Tree is unlabeled if nodes are not assigned any label.

Below two are considered same unlabeled trees



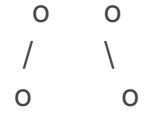
Below two are considered different labeled trees



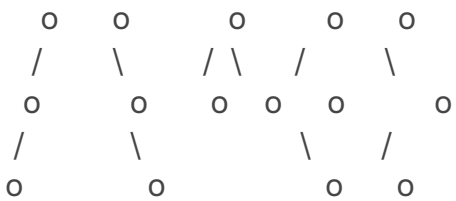
How many different Unlabeled Binary Trees can be there with n nodes?

For n = 1, there is only one tree

For n = 2, there are two trees



For n = 3, there are five trees



The idea is to consider all possible pair of counts for nodes in left and right subtrees and multiply the counts for a particular pair. Finally add results of all pairs.

For example, let T(n) be count for n nodes.
T(0) = 1 [There is only 1 empty tree]
T(1) = 1
T(2) = 2

T(3) = T(0)*T(2) + T(1)*T(1) + T(2)*T(0) = 1*2 + 1*1 + 2*1 = 5

T(4) = T(0)*T(3) + T(1)*T(2) + T(2)*T(1) + T(3)*T(0)
    = 1*5 + 1*2 + 2*1 + 5*1
    = 14

The above pattern basically represents n'th Catalan Numbers.

SERIES

First few catalan numbers are 1 1 2 5 14 42 132 429 1430 4862,...

$$T(n) = \sum_{i=1}^{n} T(i-1)T(n-i) = \sum_{i=0}^{n-1} T(i)T(n-i-1) = C_n$$

Here,
T(i-1) represents number of nodes on the left-sub-tree
T(n–i-1) represents number of nodes on the right-sub-tree
n'th Catalan Number can also be evaluated using direct formula.

T(n) = (2n)! / (n+1)!n!

```
class Solution {
public:
    int numTrees(int n) {
        int g[n+1];
        for(int i=0;i<n+1;i++){
            g[i]=0;
        }
        g[0]=1;
        g[1]=1;
        for(int i=2;i<n+1;i++){
            for(int j=0;j<i;j++){
                g[i]+=g[j]*g[i-j-1];
            }
        }
        return g[n];
```

```
    }
};
```