

## **BINARY SEARCH**

[Binary Search Example](#)

[Search an element in a sorted and pivoted array](#)

[Check for Majority element in a Sorted array](#)

[Floor and Ceiling in a sorted array](#)

[Find the Minimum length Unsorted Subarray, sorting which makes the array sorted](#)

[Count the number of occurrences of x in a sorted array](#)

[Find a Fixed Point \( where  \$a\[i\]\$  equals  \$i\$  \) in a given array](#)

[Find the maximum element in an array which is first increasing and then decreasing](#)

[Merge two sorted arrays of size N and M](#)

[Median of two sorted arrays](#)

[Longest Increasing Subsequence in  \$O\(N \log N\)\$](#)

[Find the minimum element/\(or search for an element\) in a sorted and rotated array](#)

[Given an array of infinite size containing 0/1 only and in sorted order, find position of first 1](#)

---

## **DIVIDE AND CONQUER**

[Introduction](#)

[Calculate  \$\text{pow}\(X, N\)\$  in  \$O\(\log N\)\$](#)

[Find the N-th Fibonacci Number in  \$O\(\log N\)\$](#)

[Closest Pair of Points -  \$O\(N \log N\)\$](#)

[Closest Pair of Points -  \$O\(n \log n\)\$  Implementation](#)

[Maximum Subarray Sum in  \$O\(N \log N\)\$](#)

---

## **BIT MANIPULATIONS**

[Check if a given number is a power of 2](#)

[Reverse bits of a number](#)

[Count set bits in an integer](#)

[Count number of set bits to be flipped to convert A to B](#)

[Rotate bits of an integer](#)

[Compute the absolute value \(abs\) without branching](#)

[Turn off the rightmost set bit](#)

[Add two numbers without using arithmetic operators](#)

[Position of the right most set bit](#)

[Swap every consecutive odd and even positioned bit in a number](#)

[Find the position of the only set bit](#)

[Perform nibble wise swap in a byte of data](#)

## **SORTING**

[Stability](#)

[Lower bound for comparison based sorting algorithms](#)

[External Sorting](#)

---

## **DYNAMIC PROGRAMMING**

[Overlapping Subproblems Property](#)

[Optimal Substructure Property](#)

[0-1 Knapsack Problem](#)

[Min Cost Path](#)

[Minimum number of jumps to reach end](#)

[Maximum size square sub matrix with all 1s](#)

[Matrix Chain Multiplication](#)

[Coin Change](#)

[Longest Common Substring](#)

[Longest Increasing Subsequence](#)

[Maximum Sum Increasing Subsequence](#)

[Box Stacking Problem](#)

[Rod Cutting](#)

[Minimum insertions to form a palindrome](#)

[Longest Palindromic Substring](#)

[Longest Palindromic Subsequence](#)

[Palindrome Partitioning](#)

[Dice Throw](#)

[Maximum sum rectangle in a 2D matrix](#)

[Largest Independent Set Problem](#)

[Egg Dropping Puzzle](#)

[Optimal BST](#)

[Find if a string is interleaved of two other strings](#)

[Optimum Strategy to maximise coins to collect from either ends](#)

---

## **LINKED LIST**

[Nth node from the end of a Linked list](#)

[Reverse a Linked List](#)

[Recursive function to print reverse of a Linked List](#)

[Check if a singly linked list is a Palindrome](#)

[Delete Linked list](#)

[Detect loop in a Linked List](#)

[Detect and remove loop in a Linked List](#)

[Middle of a Linked list](#)

[Find the intersection point of two Linked Lists](#)

[Intersection of two Sorted Linked Lists](#)

[Union and Intersection of two Linked Lists](#)

[Delete Alternate Nodes of a Linked List](#)

[Rotate a Linked List by K nodes](#)

[Reverse a Linked List in groups of given size K](#)

[Reverse alternate K nodes in a Singly Linked List](#)

[Merge two sorted linked lists](#)

[Sort a linked list of 0s, 1s and 2s](#)

[Segregate even and odd nodes in a Linked List](#)

[Move vowels to end of Linked List maintaining the order](#)

[Alternating split of a given Singly Linked List](#)

[Find a triplet from three linked lists with sum equal to a given number](#)

[Add two numbers represented by linked lists](#)

[Product of two numbers given in Linked List](#)

[Pairwise swap elements of a given linked list](#)

[Swap Kth node from beginning with Kth node from end in a Linked List](#)

[Delete N nodes after M nodes of a linked list](#)

[Swap odd and even nodes in a Linked List](#)

[Merge a linked list into another linked list at alternate positions](#)

[Merge Sort for Linked Lists](#)

[Flattening a Linked List](#)

[Copy a linked list with next and arbit pointer](#)

[Memory Efficient DLL using XOR](#)

[Memory Efficient DLL](#)

---

## **TREES**

**Size of a Tree**

**Height of a Tree**

**Diameter of a Binary Tree**

**Maximum width of a binary tree**

**Check if Two Trees are Identical**

**Tree Traversal**

Populate Inorder Successor for all nodes

Level Order Traversal

Connect nodes at same level

Level Order Traversal in Spiral Form

Reverse Level Order Traversal

Vertical Sum in a given Binary Tree

Difference between sums of odd level and even level nodes of a Binary Tree

Check if all leaves are in same level or not

Delete a tree

Zig-Zag Traversal of Tree

Boundary Traversal of binary tree

Count leaf nodes in a binary tree

Lowest Common Ancestor in a BINARY Tree

Print nodes at distance K from root

Print Left View of a Binary Tree

In a binary tree, if parent is 0, then left child is 0 and right child is 1. if parent is 1, then left child is 0 and right child is 1

kth node value which is present at Nth level

Convert the given Binary tree to its Double tree

Find the node with minimum value in a BST

Add all greater values to every node in a given BST

Inorder Successor in BST

Lowest Common Ancestor in a BST

Check if two trees are Isomorphic

Check if a given binary tree is SumTree or not

Check if given Binary Tree is BST or not

Check if Binary Tree is Balanced or not

Check if given BT is Complete Binary Tree or not

Check if given Binary Tree can be Folded or not

Convert Tree to its Mirror Tree

Convert a given tree to its Sum Tree

Check for children sum property

Convert a BT to a tree that holds children sum property

[Convert a BST to a Binary Tree such that sum of all greater keys is added to every key](#)

[Find k-th smallest element in BST](#)

[Find pair of numbers in a BST adding upto K](#)

[Two nodes of a BST are swapped, correct the BST](#)

[Print BST keys in the given range](#)

[Remove BST keys outside the given range](#)

[Remove all nodes in a BST which lie on a path having sum less than k](#)

[Print all root-to-leaf Paths](#)

[Root to leaf path sum equal to a given number](#)

[Find the maximum sum leaf to root path in a Binary Tree](#)

[Print Ancestors of a given node](#)

[Print ancestors of a given binary tree node without recursion](#)

[BST to DLL](#)

[Sorted DLL to Balanced BST](#)

[Sorted Array to Balanced BST](#)

[Sorted Linked List to Balanced BST](#)

[Merge Two Balanced Binary Search Trees](#)

[Serialisation - storing a BT in a file](#)

[Construct Tree from given Inorder and Preorder traversals](#)

[Construct Special Binary Tree from given Inorder traversal](#)

[Construct a special tree from given preorder traversal](#)

[Construct Full Binary Tree from given preorder and postorder traversals](#)

[Construct Tree from Ancestor Matrix](#)

[Construct Ancestor Matrix from Tree](#)

[Find the largest BST subtree in a given Binary Tree if entire subtree has to be taken](#)

[Find the largest BST subtree in a given Binary Tree if part of subtree can also be taken](#)

[Find the maximum weight node in a tree if each node is the sum of the weights all the node](#)

[Morris Inorder Traversal - Threaded binary Trees](#)

[Ternary Search Tree](#)

[TRIE](#)

## **STACKS & QUEUES**

[Implement two stacks in one array](#)

[Implement Stack using Queues](#)

[Implement Queue using Two Stacks](#)

[Implement stack with push\(\), pop\(\), getMin\(\) \[ each in  \$O\(1\)\$  time \]](#)

[Design a stack with operations on middle element](#)

[Check for balanced parentheses in an expression](#)

[Expression Evaluation with operator priority and multiple braces](#)

[Implement LRU Cache](#)

[The Stock Span Problem](#)

[Print the First Greater Element on the right side for each element](#)

[Largest Rectangular Area in a Histogram](#)

[Implement three stacks in one array](#)

[Find maximum element in every window of size K in an array](#)

## **STRINGS**

[Print reverse of a string using recursion](#)

[Print all permutations of a string](#)

[Given a string find its first non-repeating character](#)

[Reverse words in a given string](#)

[Print all the duplicates in the input string](#)

[Move all even-index positioned chars to end of string maintaining even-odd order](#)

[Find Lexicographic rank of a string](#)

[Run Length Encoding](#)

[Implement atoi function](#)

[Print the first unique character in a string](#)

[Write strcmp function and returns -1 if  \$s1 < s2\$ , 0 if  \$s1 = s2\$ , else returns 1](#)

[Remove from string  \$s1\$ , all the characters that are present in string  \$s2\$ .](#)

[Check whether two strings are anagram of each other](#)

[Length of the longest substring without repeating characters](#)

[Find the smallest window in a string containing all characters of another string](#)

[Recursively remove all adjacent duplicates](#)

[Evaluate a regular expression  \$a^\*b^?c\$  with  \$aaaabcc\$](#)

[String Matching - KMP Algorithm](#)

---

## **ARRAYS**

**Find Union and Intersection of two sorted arrays**

**Find the Number Occurring Odd Number of Times**

**Find missing number from array of N-1 numbers in the range 1 to N**

**Find the two non-repeating elements in an array of repeating elements**

**Find the two numbers with odd occurrences in an unsorted array**

**Find the next smallest palindrome**

**find the next higher permutation of the given number as an array of digits. If such a number doesn't exist, return -1.**

**Find pair of numbers with given sum X**

**Find a,b,c such that  $a^2+b^2=c^2$**

**Find a triplet that sum to a given value**

**Find four elements that sum to a given value**

**Find two repeating elements in a given array**

**Find the 3 elements such that  $a[i] < a[j] < a[k]$  and  $i < j < k$**

**Find the least positive number missing in an unsorted array.**

**Find the row with maximum number of 1s in a 2D row-wise sorted matrix**

**Find Maximum difference between two elements such that the larger element appears after the smaller element in array**

**Find two numbers such that their difference is minimum**

**Find two elements whose sum is closest to zero**

**Find the first subarray which has a zero sum in an array**

**Find duplicates in  $O(n)$  time**

**Find points in an array where  $\text{left-sum} = \text{right-sum}$**

**Search a number in a row wise and column wise sorted 2D matrix**

**Print matrix spirally**

**Measure amount of water in j'th glass of i'th row of glasses arranged like a pyramid**

**Construct Product Array without division operator: each element = product of elements in  $\text{arr}[]$  except  $\text{arr}[i]$**

**Shuffle a given array**

**Sort elements by frequency**

**Segregate Even and Odd numbers**

**Segregate 0s and 1s**

**Sort an array of 0s, 1s and 2s**

**Move all zeroes to end of array**

**Rearrange positive and negative numbers alternatively**

**Given an array [a1b2c3d4] convert to [abcd1234]**

**Maximum and minimum of an array using minimum number of comparisons**

[Given binary 2D Matrix, for all cells as 1, set corresponding row and column as 1](#)

[Turn an image by 90 degrees](#)

[Inplace M x N size matrix transpose](#)

[Intersection of n sets](#)

[Print Matrix Diagonally](#)

[Rotate an array by d elements](#)

[Largest Sum Contiguous Subarray](#)

[Maximum Product Subarray](#)

[Maximum Length Bitonic Subarray](#)

[Find continuous subarray with given sum](#)

[Largest subarray with equal number of 0s and 1s](#)

[Maximum subsequence sum such that no two elements are adjacent](#)

[Find the majority element \(with frequency  \$> N/2\$ \)](#)

[Find the maximum repeating number](#)

[Count the number of Inversions in an array](#)

[Find kth smallest element](#)

[Stock Buy Sell to Maximize Profit](#)

[Print the elements greater than all the elements to its right](#)

[calculate the area of water collected by rain holded by bar graph/histogram](#)

---

## **Graphs**

[Graph representations](#)

[Depth First Traversal for a Graph](#)

[Breadth First Traversal for a Graph](#)

[Detect Cycle in a Directed Graph](#)

[Find if there is a path between two vertices in a directed graph](#)

[Find number of connected components in an undirected graph](#)

[Bellman Ford Algorithm](#)

[Floyd Warshall Algorithm](#)

[Kruskal's MST](#)

[Dijkstra's Shortest Path Algorithm](#)

[Union Find](#)

[Union Find by rank](#)

[Topological Sorting for DAG](#)

[Detect cycle in an undirected graph](#)

[Strongly Connected Components](#)

[Shortest Path in Directed Acyclic Graph](#)

[Maximum Bipartite Matching](#)



[Check if Bipartite Graph](#)

[Stable Marriage Problem](#)

[Longest Path in a Directed Acyclic Graph](#)

[Find maximum number of edge disjoint paths between two vertices](#)

[Graph Coloring](#)

[Travelling Salesman Problem](#)

---

### **COMPUTATIONAL GEOMETRY**

[Check whether a given point lies inside a triangle or not](#)

[check if two given line segments intersect](#)

[check if a given point lies inside or outside a polygon](#)

[Convex Hull | Set 1 \(Jarvis's Algorithm or Wrapping](#)

[Given n line segments, find if any two segments intersect](#)

### **MATHS**

[Binomial Coefficient  \$nCr\$](#)

[Pascal's Triangle in nth row](#)

[Select a random number from stream, with  \$O\(1\)\$  space](#)

### **MISCELLANEOUS**

[Little and Big Endian](#)

[Memory Leak](#)

[Greedy Algorithms | Set 1 \(Activity Selection Problem\)](#)

[Print all subsets](#)

[Make a fair coin from a biased coin](#)

[Find the first circular tour that visits all petrol pumps](#)

---

### **HEAP**

[Sort a nearly sorted \(or K sorted\) array](#)

[Find the k most frequent words from a file / running stream of numbers](#)

[Sort numbers stored on different machines](#)

[Huffman Coding](#)

[Program to print last 10 lines of a file](#)

[Merge k sorted arrays](#)

[Find a median in running stream of numbers.](#)

---

---

## **C++**

OOPS concepts like:

Inheritance, Encapsulation, Abstraction, Polymorphism

virtual function, friend function

function overloading, overriding

constuctor, templates

exception handling

storage classes,type qualifiers, modifiers,

macros,inline

memory allocation

reference, pointers

---

**\*STRICTLY NOT FOR REPRODUCTION**