

THRIVER ASHISH'S DATA STRUCTURES AND ALGORITHM SHEET

This 90 days Roadmap covers all the topics of DS-Algo which are most important for technical interviews and also important to become a good software engineer

This sheet also covers all the questions that are needed to be solved in order to crack tech giants interviews

90 DAYS



<https://www.youtube.com/c/thriverashish>



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ARRAYS

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10 DAYS



DAY 1

Understand Big O notation (Time and Space complexity)



DAY 2

-- Study Basic Concepts of Array and get familiar with List DS in the programming language you chose.

-- Reverse the array in place (space complexity should be constant)

Input —> 3,5,9,4,2

Output —> 2,4,9,5,3

-- Insert an element in between of array

DAY 5

- Understand Binary Search Algorithm
- Search an element in the Sorted Array
- Leetcode Question 33 --> Search in Rotated Sorted Array
- Leetcode Question 50 --> Implement $\text{pow}(x, n)$, which calculates x raised to the power n (i.e., x^n)

DAY 6

- Understand 2D matrix/ @D Arrays
- Search a 2D Matrix Leetcode 74
- Set Matrix to Zero —> Leetcode 73
- Pascals Triangle —> Leetcode 118
- Rotate Matrix —> Leetcode 48

DAY 3 AND DAY 4

- Understand Quick Sort, Merge Sort, Insertion Sort and Selection Sort
- Implement them all in your fav programming language

DAY 7

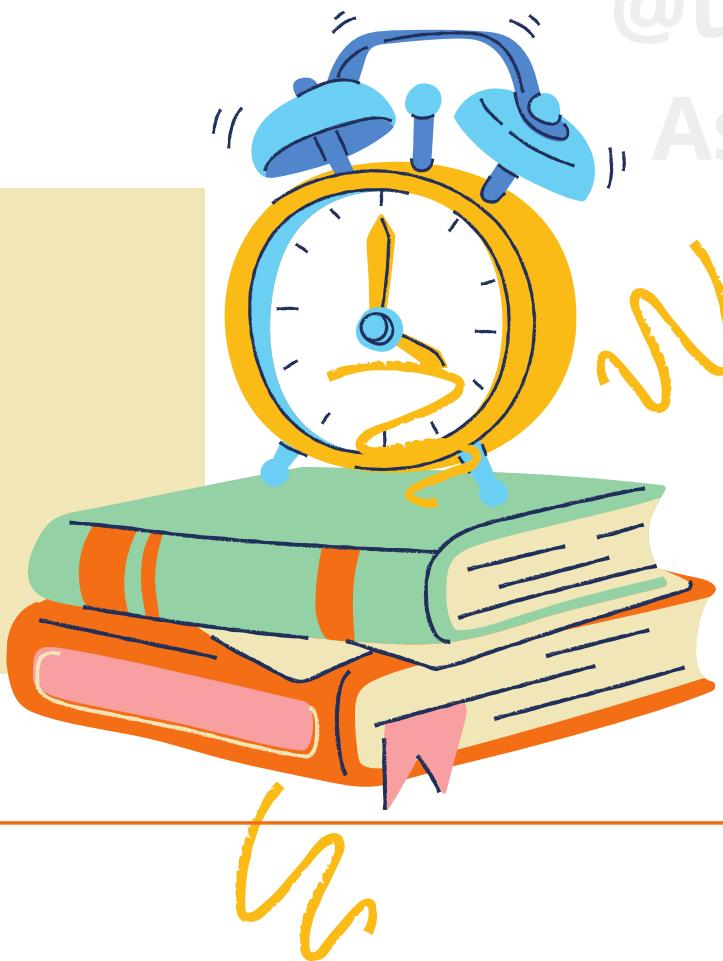
- Kadane's Algo —> Maximum Subarray Leetcode 73
- Sort Array of 0's 1's and 2's Leetcode 75
- Two Sum Problem —> Leetcode 1
- Find Duplicate



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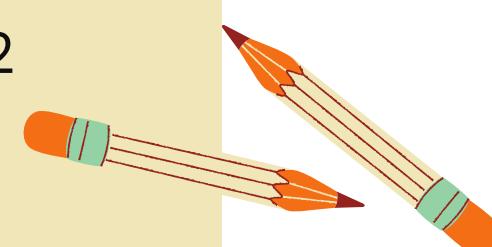
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DAY 8

- Stock Buy and Sell --> Leetcode 121
- Next Permutation --> Leetcode 32
- Merge Intervals --> Leetcode 56
- Merge Sorted Arrays --> Leetcode 88



DAY 9

- Reverse pairs --> Leetcode 493
- Grid Unique Paths --> Leetcode 62
- 3 Sum problem --> Leetcode 15
- 4 Sum Problem --> Leetcode 18



DAY 10

- Repeat Missing Number Array --> InterviewBit
<https://www.interviewbit.com/problems/repeat-and-missing-number-array/>
- Longest Consecutive Subsequence —> Leetcode 128
- Subarray with given Xor —> Interview Bit
<https://www.interviewbit.com/problems/subarray-with-given-xor/>
- Longest Substring without repeat —>



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04 DAYS



DAY 11

- Understand the concept of Linked List
- Understand its Advantages and disadvantages over Arrays
- Implement the Linked list in the language you chose:
- Create Linked List class
 - Create a Node
 - Add Node
 - Remove Node
 - Find Node in Linked List



DAY 13

- Add Two Numbers given in linked list
- Detect and remove Linked List Cycle
- Intersection of Two Linked Lists
- Palindrome Linked List



DAY 12

- Reverse Linked List
- Find Middle of the Linked List
- Remove Nth Node From End of List
- Merge Two Sorted Lists

DAY 14

- Reverse Nodes in k-Group
- Rotate List
- Flattening a Linked List
- Copy List with Random Pointer



STACK

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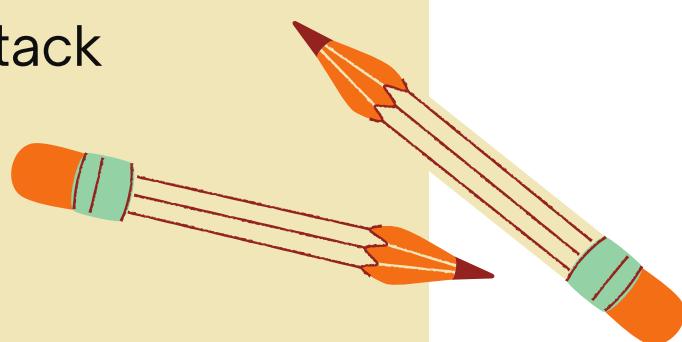
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03 DAYS



DAY 15

- Understand the basics of Stack Data Structures
- Relate with some real-life examples like
- Stack of Note books and Stack of coins
- Implement the Stack using Arrays (Push Pop etc functionalities)
- Implement the Stack with Linked List



DAY 17 (LEVEL UP)

- Next Greater Element using Stack --> Leetcode 496
- Find largest rectangle in Histogram --> Leetcode 84



DAY 16

- Sort a Stack
- Valid Parenthesis --> Leetcode 20
- Retrieve Minimum Element from the Stack --> Leetcode 155



QUEUES

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03 DAYS

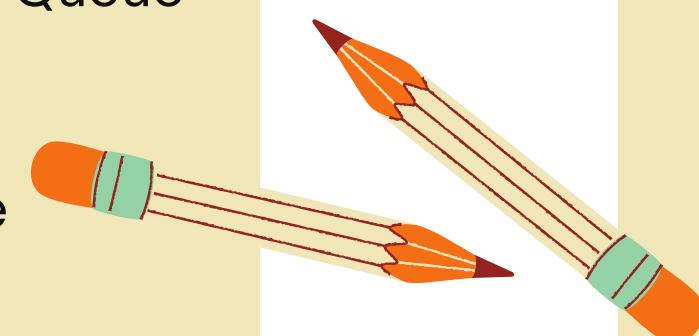
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DAY 18

- Understand the basics of Queue Data Structures
- Relate with some real-life examples
- Implement the Queue using Arrays
- Implement the Queue using the Linked List



DAY 21

- Queue Reversal
- Implement LRU Cache
- Implement LFU Cache



DAY 22

- Learn Sliding window Coding Pattern
- Sliding Window Maximum Leetcode 239
- First negative integer in every window of size



DAY 19

- Implement Queue using Stack
- Implement Stack using Queue
- Implement and understand Double Ended Queue

DAY 20

- Understand and Implement Circular Queue
- Fine examples where circular Queues can be used.
- Implement Producer Consumer Problem

DAY 23

- Trapping Rain Water (Stack-based) Leetcode 42
- Simplify Directory Path (Stack Based) Leetcode 71
(No Priority Queue for now)



RECURSION

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04 DAYS

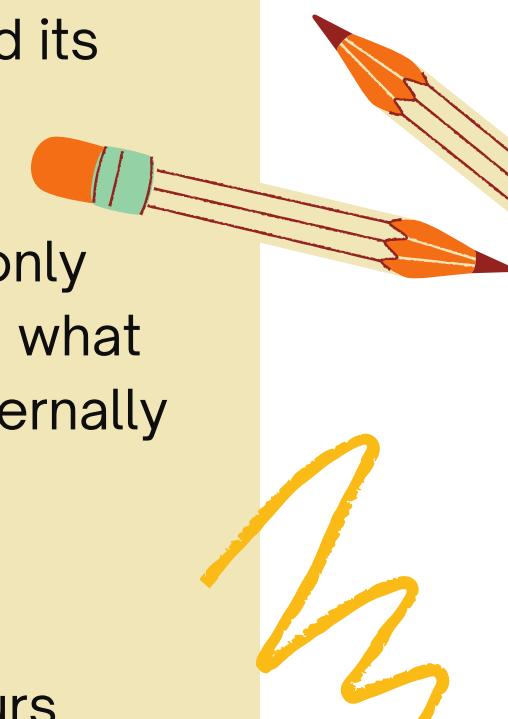
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DAY 24

- Understand Recursion and its base conditions etc.
- Understand in depth not only what recursion is but also what kind of Data str it uses internally etc.
- You will get to know how StackOverflow error occurs



DAY 26

- Subset Sums
- Subsets II



DAY 25

- Fibonacci Number
- Reverse the Linked List using the Recursive approach
- Reverse LinkedList in k-groups

DAY 27

- Combination Sum
- Combination Sum II
- Palindrome Partitioning
- Permutation Sequence



REVISION

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03 DAYS

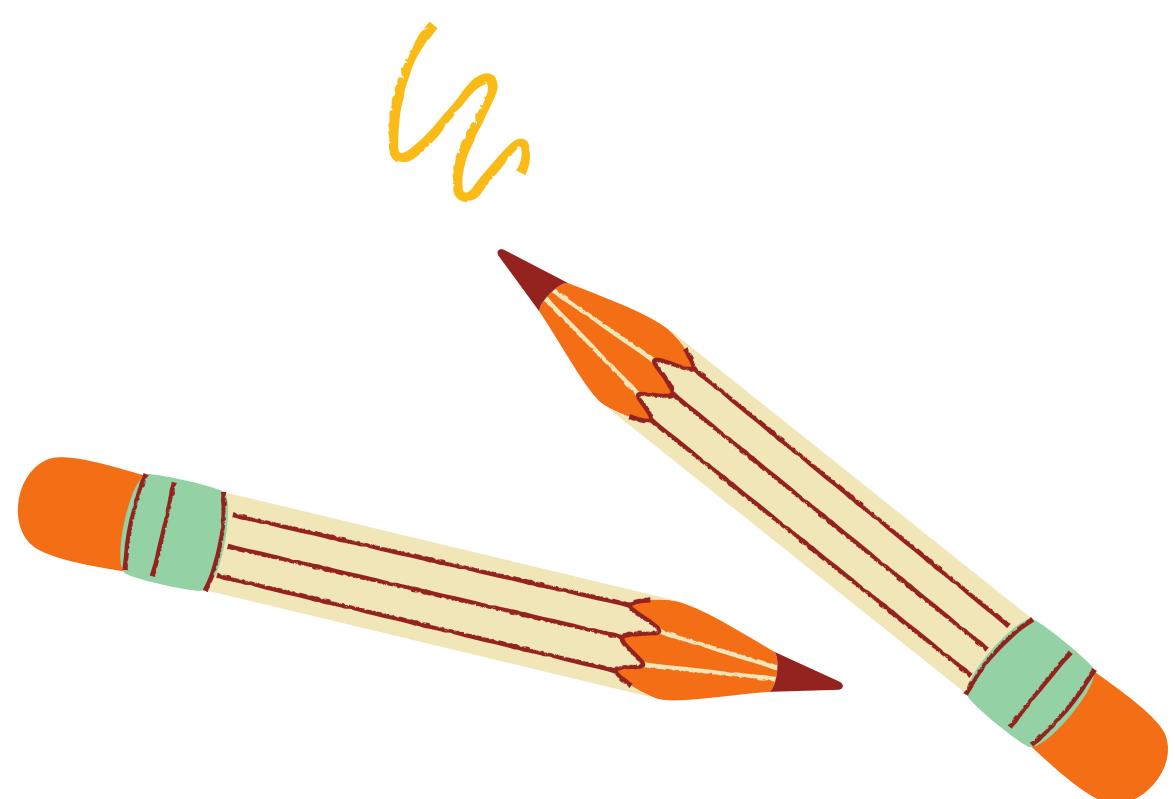
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DAY 28

Revise Arrays
and Linked List

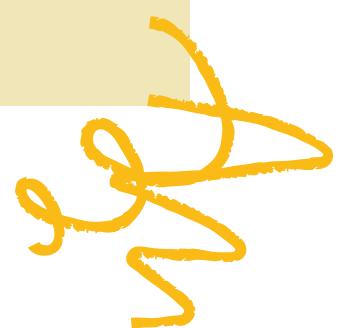


DAY 29

Revise Queues
and Stacks

DAY 30

Revise Recursion
and practice



HASHING AND HASH BASED DS

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04 DAYS

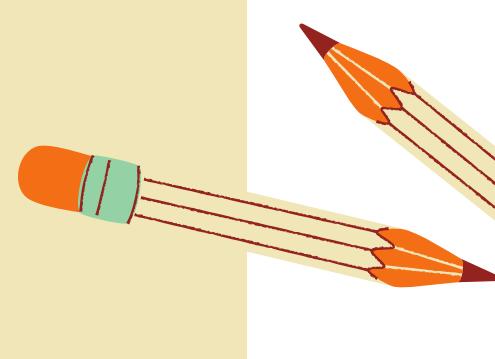
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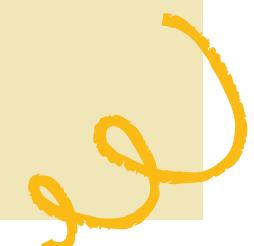
DAY 31

- Understand what exactly Hash-based Data structures are!
- What is hashing?
- What is a hash code?
- What is Hash Function?
- Understand the concept of ROLLING HASH
- Understand the usage and application of Hash Tables like
 - Used to implement database indexes.
 - Used to implement associative arrays.
 - Used to implement the different data structures like hashMap/HashSet etc



DAY 33

- Design HashSet -- Leetcode 705
- Design HashMap -- Leetcode 706
- Two Sum -- Leetcode 1
- Running Sum of 1D Array -- Leetcode 1480



DAY 32

- Understand the internals of HashMap and HashSet
- Read the code of the already implemented hashMap/HashSet library if the code is available like in Java.
- Do a bit of hands-on, iterate the hashMap/set etc

DAY 34

- Check If a String Contains All Binary Codes of Size K – Leetcode 1461
- K Divisible Elements Subarrays – Leetcode 2261
- Number of Distinct Islands -- Leetcode 711



TREES AND TRIES

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10 DAYS

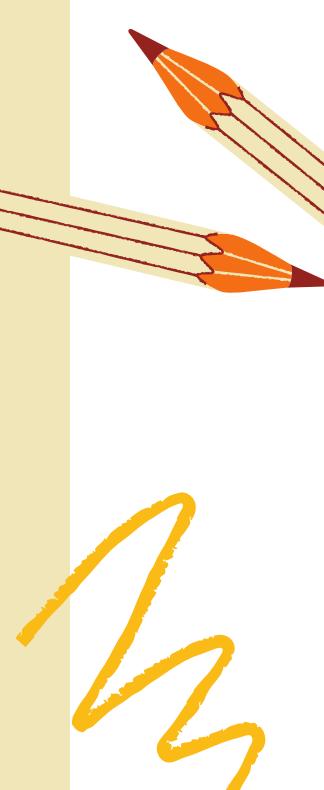
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DAY 35

- Read the theory of Binary Trees and different types of Binary Trees
 - Understand the Node structure of Binary Tree
- Understand and Write Iterative code for following Traversals
- Level Order Traversal
 - Inorder Traversal - Leetcode 194
 - PreOrder Traversal
 - Postorder Traversal
 - Zig Zag Level Order Traversal



DAY 37

- Same Tree - Leetcode 100
- Invert Binary Tree - Leetcode 226
- Symmetric Binary Tree - Leetcode 101
- Left/Bottom/Top View of Binary Tree
- Vertical Order Traversal of a Binary Tree - Leetcode 987

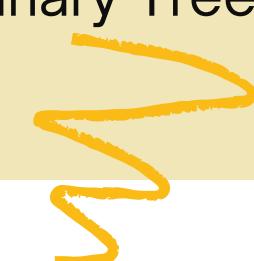


DAY 36

- Implement Binary Tree
- Add Node
- Remove Node
- Traverse Node
- Construct Binary Tree from Inorder and PostOrder - Leetcode 105

DAY 38

- Maximum Width of Binary Tree - Leetcode 622
- Maximum Depth of Binary Tree - Leetcode 104
- Diameter of Binary Tree - Leetcode 543
- Balanced Binary Tree - Leetcode 110
- Lowest Common Ancestor of a Binary Tree - Leetcode 236



DAY 39

- Identify the Path to the given Node
- Binary Tree Maximum Path Sum - Leetcode 124
- Flatten Binary Tree to Linked List - Leetcode 1114
- Mirror Binary Tree
- Serialize and Deserialize Binary Tree - Leetcode 297
- Vertical Sum of Nodes in Binary Tree



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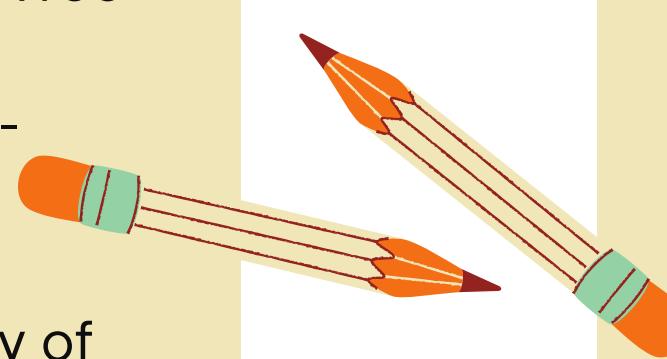
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10 DAYS



DAY 40

- Understand Binary Search Tree
- Search an Element in BST - Leetcode 700
- Understand the Complexity of searching in BST
- Find Lowest Common Ancestor of a given node in BST - Leetcode 235
- Convert Sorted Array to Binary Search Tree - Leetcode 108
- Validate Binary Search Tree - Leetcode 98



DAY 42

- Understand Self-Balancing Binary Search Trees
- Read and Understand Red Black Tree
- Read and Understand AVL Tree

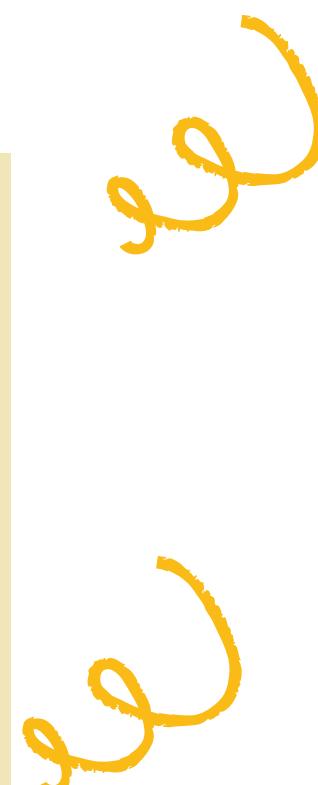


DAY 41

- Construct BST from Preorder Traversal - Leetcode 1008
- Recover BST - Leetcode 99
- Identify Predecessor and Successor of a Node in BST
- Kth Smallest Element in a BST
- Two Sum - Input is BST - Leetcode 653

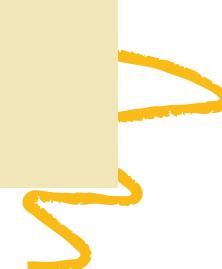
DAY 43

- Understand about Quad trees and N-Ary Trees
- Understand Trie Data Structure
- Implement Trie (Prefix Tree)



DAY 44

- Maximum XOR of Two Numbers in an Array - Leetcode 421
- Maximum XOR With an Element From Array - Leetcode 1707
- Hotel Reviews - InterviewBit



HEAP

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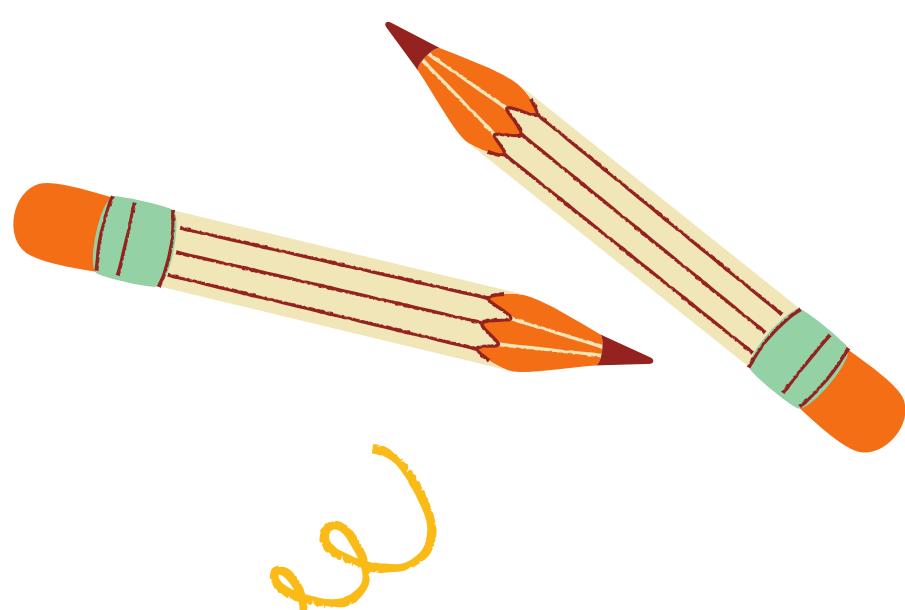
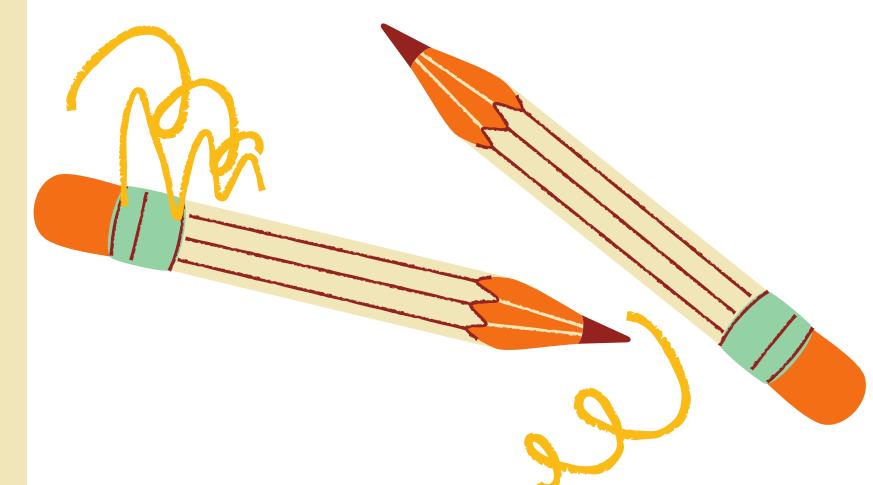
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03 DAYS



DAY 45

- Understand what HEAP DS is all about like properties and all (heap is a complete Binary Tree)
- Implement its Operations (Min and Max Heap)
 - Heapify
 - Insert Element into Heap
 - Delete Element from Heap
 - Peek
 - Extract Min/Max
- Understand and Read Heap Data Structure Applications
 - Heap is used while implementing a priority queue.
 - Dijkstra's Algorithm
 - Heap Sort



DAY 46

- Distinct Numbers in the window (Interview Bit)
- Merge K Sorted Arrays
- Kth Largest Element in an Array - Leetcode 215



DAY 47

- Top K Frequent Elements - Leetcode 347
- Maximum Sum Combinations - InterviewBit
- Find Median from Data Stream (Hard) - Leetcode 295



GRAPH

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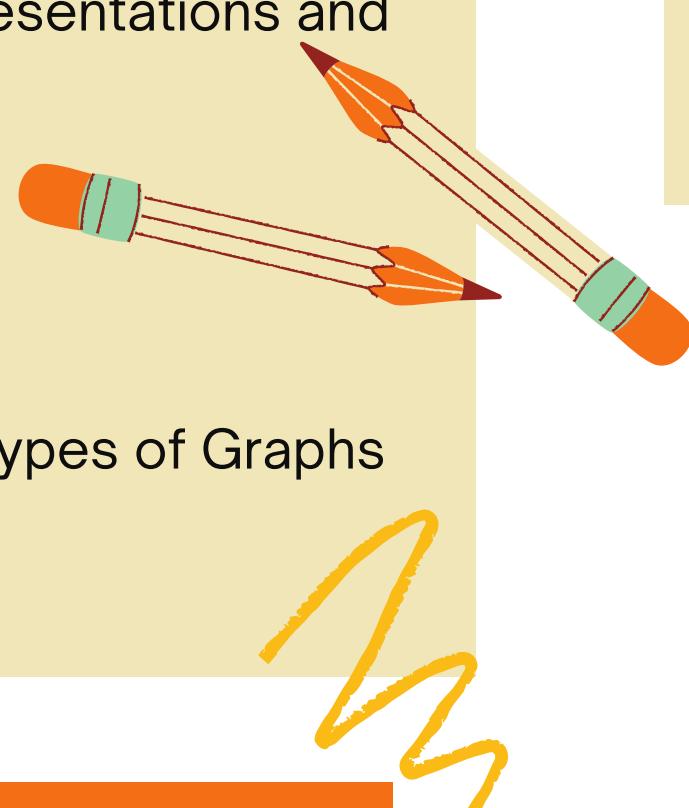
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10 DAYS



DAY 48

- Understand Graphs
- Understand all three Graph representations and do hands-on
 - Edge list
 - Adjacency Matrix
 - Adjacency List
- Read and Understand Different types of Graphs
 - Directed Graphs
 - Weighted Graphs etc



DAY 51

- Prims - Minimum spanning tree
- Kruskal - Minimum spanning tree

DAY 52

- Topological sort
- Articulation points in a graph
- Bridges in a graph
- Johnsons algorithm

DAY 49

- Breadth-first search (BFS)
- Depth-first search (DFS)

DAY 50

- Dijkstra - The shorter path from a given node to all vertices
- Floyd Warshall - The shorter path from every vertex to every other vertex

DAY 54

- Valid path -- Leetcode 1391
- Is Graph Bipartite? – Leetcode 785
- Smallest multiple with 0 & 1

DAY 55

- Commutable islands
- Detect cycle in Directed and Undirected Graph
- Black shapes

DAY 56

- Knight on chess board
- Word ladder I
- Word ladder II

DAY 53

- Clone Graph - Leetcode 133
- Number of Islands -- Leetcode 200
- Course Schedule -- Leetcode 207

DAY 57

- Smallest sequence with given primes
- Capture regions on board
- Word search board



REVISION

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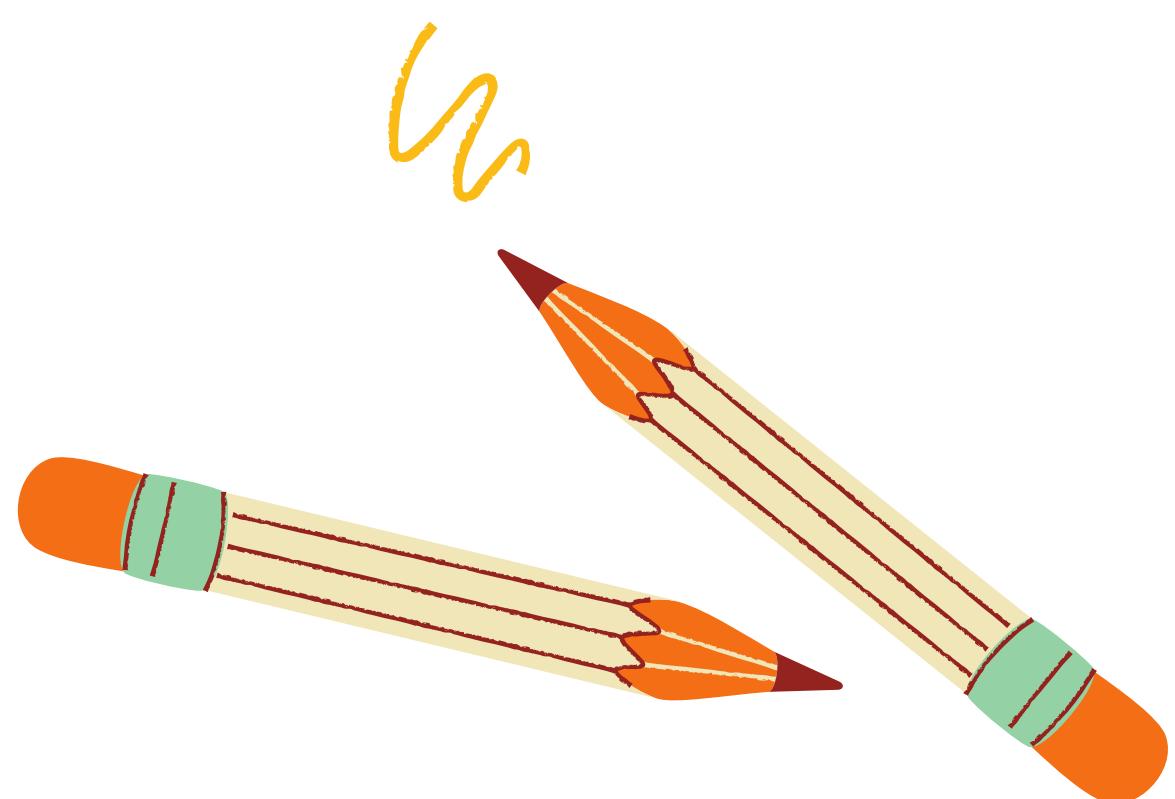
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03 DAYS



DAY 58

Revise Hashing
and Practice

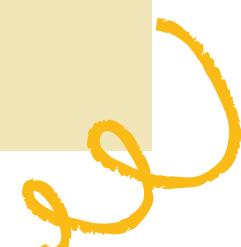


DAY 59

Revise Trees
and Tries

DAY 60

Revise Graphs
and practice



GREEDY

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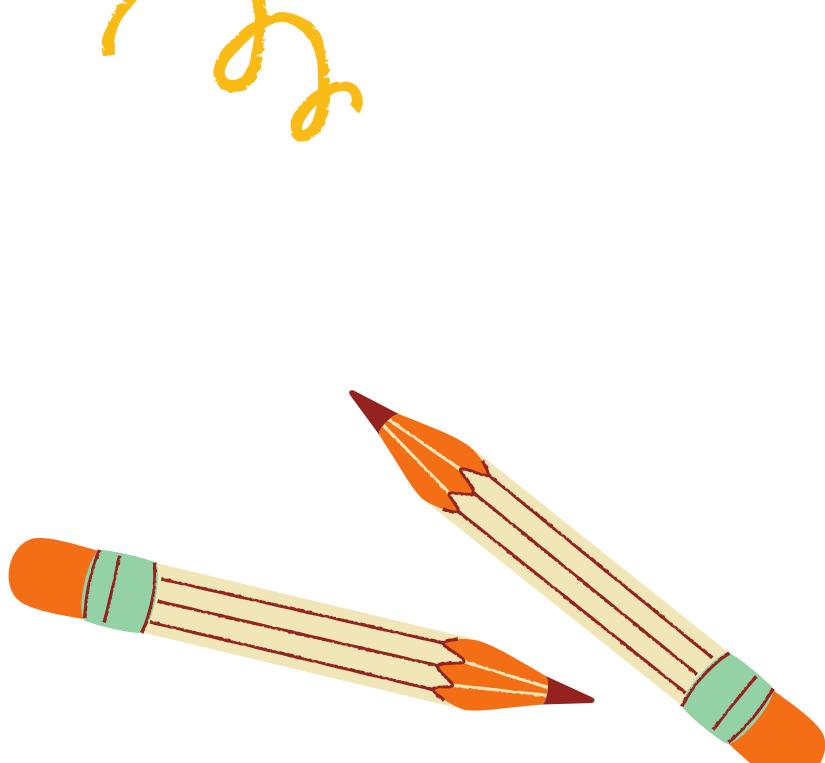
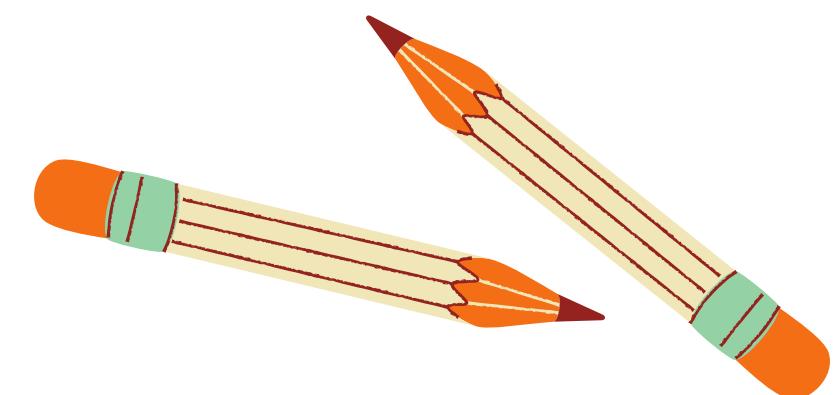
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02 DAYS



DAY 61

- Fractional Knapsack problem
- N-Meetings in one room
- Job Sequencing Problem



DAY 62

- Minimum Platforms
- Find Minimum Number



DYNAMIC PROGRAMMING

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10 DAYS

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DAY 63

- Understand what overlapping Subproblems mean?
- Understand memoization
- Fibonacci Number
- Catalan Number

DAY 66

- Coin Change Leetcode 322
- Partition Equal Subset Sum Leetcode 416
- Minimum Cost to Cut a Stick Leetcode 1547

DAY 64

- Maximum Product Subarray Leetcode 152
- Longest Increasing Subsequence Leetcode 300
- Longest Common Subsequence Leetcode 1143

DAY 67

- Ways to decode
- Stairs
- Jump game

DAY 68

- Min jumps
- Longest AP
- Evaluate expression to true

DAY 65

- Ones and Zeroes Leetcode 474
- Edit Distance Leetcode 72
- Minimum Path Sum Leetcode 64

DAY 69

- Best time to buy and sell stocks - 1
- Min sum path in matrix

DAY 70

- Max rectangle in binary matrix
- Rod cutting
- Coin sum infinite

DAY 71

- Best time to buy and sell stocks II
- Arrange II
- Best time to buy and sell stocks III

DAY 72

- Equal avg partition
- Regex match
- Regex match II

DAY 73

- Unique BST II
- Max sum path in BT
- Palindromic partitioning



BACKTRACKING

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05 DAYS

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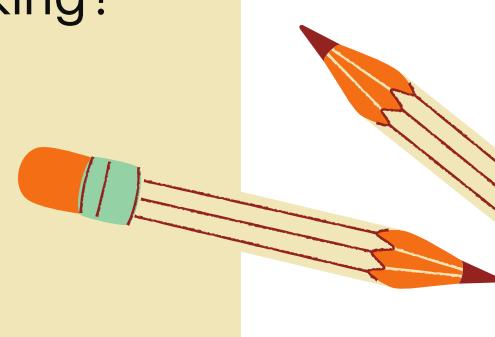


DAY 74

- Understand why Backtracking?
 - when should we apply backtracking
 - how should we apply backtracking

Solve Following Questions

- Subset I
- Subset II



DAY 76

- Palindrome Partitioning -- Leetcode 131
- Generate all parenthesis
- NQueens -- Leetcode 51



DAY 75

- Combination sum -- Leetcode 39
- Combination sum II -- Leetcode 40

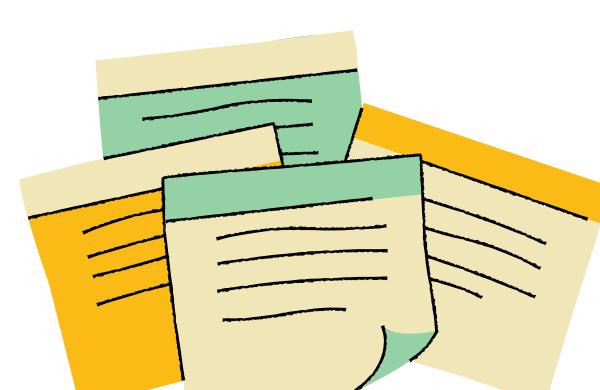
DAY 77

- Sudoku Solver -- Leetcode 37
- Permutations -- Leetcode 46
- Kth permutation sequence Leetcode -- 60



DAY 78

- Gray code
- M-Coloring Problem
- Rat in a Maze



STRINGS

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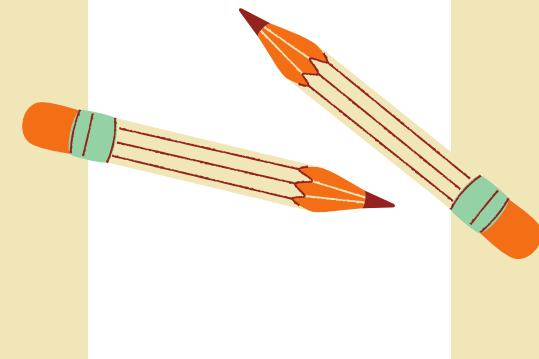
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04 DAYS



DAY 79

- Reverse Words in a String
Leetcode 151
- Longest Palindromic Substring
Leetcode 5
- Roman to Integer Leetcode 13



DAY 81

- Implement strStr() {Z Function}
Leetcode 28
- KMP algo / LPS(pi) array -- Leetcode 28
- Minimum Characters required to make
a String Palindromic -- Inerview b^t



DAY 80

- String to Integer (atoi)
Leetcode 8
- Longest Common Prefix
Leetcode 14
- Rabin Carp

DAY 82

- Valid Anagram -- Leetcode 242
- Count and Say -- Leetcode 38
- Compare Version Numbers -- Leetcode 165



RANDOM QUESTIONS

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08 DAYS



DAY 83-85

Solve Random Array,
Linked List, Stacks
and Queue Questions



DAY 59

Solve Random DP,
Backtracking, Strings,
and other Questions



DAY 86

Solve Random
Recursion Hashing,
Tree, and Graph
Questions

DAY ...

Start Applying,
you are Ready



GOOD LUCK

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Ace the best!

