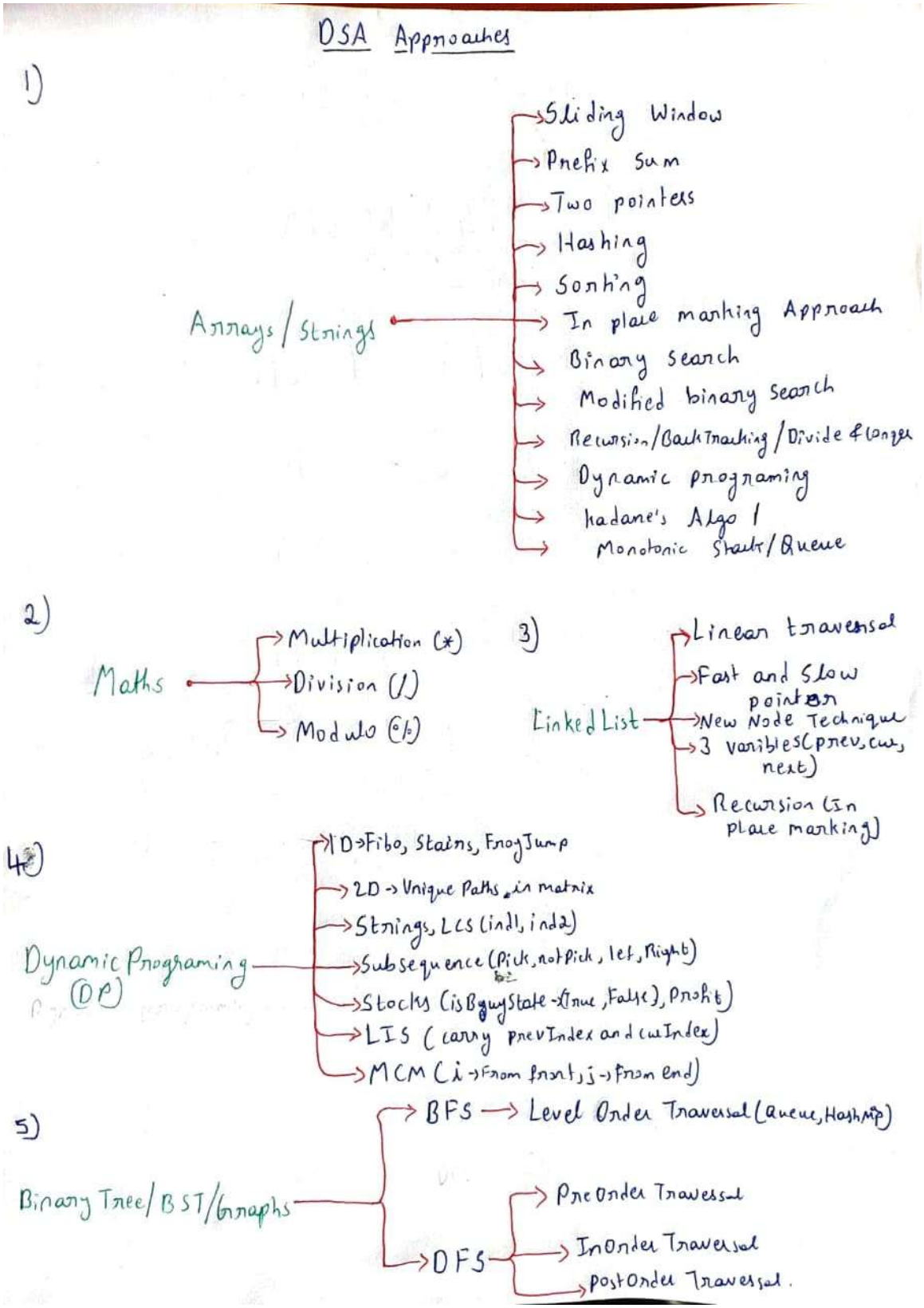
DSA Approaches



DSA Patterns with Leetcode Mapping

S.No	Pattern	Data Structures	LeetCode Problems
1	Sliding Window / Prefix Sum	Array, String	3, 643,76, 239, 325
2	Two Pointers	Array, String	11, 15, 167
3	Binary Search / Modified Binary Search	Array	33, 153, 69, 410, 875, 1011
4	Sorting	Array	75, 912, 56
5	Hashing (HashMap / HashSet)	Array, String	1, 217, 242
6	In-place Marking Approach	Array	448, 41, 442
7	Backtracking / Recursion / Divide & Conquer	Array, String, Matrix	46, 78, 51, 200, 130, 77
8	Fast & Slow Pointers	Linked List	141, 142, 876
9	In-place Reversal of Linked List	Linked List	206, 92, 25
10	Dynamic Programming	Array, String, Matrix	70, 322, 1143, 198, 53
11	DFS / BFS Traversal	Tree	102, 104, 124
12	DFS / BFS Traversal	Graph	200, 207, 133
13	Bit Manipulation	Array, Number	136, 78, 191
14	Greedy	Array, Interval	55, 435, 253
15	Heap / Priority Queue	Array, Heap	215, 347, 295
16	Cyclic Sort	Array	41, 448, 442
17	Trie	String	208, 211, 421
18	Union-Find (DSU)	Graph	261, 323, 684
19	Matrix Traversal	Matrix / Graph	48, 733, 200, 130

Grouped By Datastructures

Data Structures	Pattern	LeetCode Problems
Array / String	Sliding Window / Prefix Sum	3, 76, 239, 325
	Two Pointers	11, 15, 167
	Binary Search / Modified Binary Search	33, 153, 69, 410, 875, 1011
	Sorting	75, 912, 56
	Hashing (HashMap / HashSet)	1, 217, 242
	In-place Marking Approach	448, 41, 442
	Backtracking / Recursion / Divide & Conquer	46, 78, 51, 200, 130, 77
	Dynamic Programming	70, 322, 1143, 198, 53
	Kadane's Algorithm	53, 918
	Monotonic Stack / Queue	84, 85, 739
Math	Mathematical, Multiplication,Divide and Modulo operator	50, 204, 400
Linked List	Fast & Slow Pointers	141, 142, 876
	In-place Reversal of Linked List	206, 92, 25
Tree	DFS / BFS Traversal	102, 104, 124
Graph	DFS / BFS Traversal	200, 207, 133
	Union-Find (DSU)	261, 323, 684
Array /	Bit Manipulation	136, 78, 191

Data Structures	Pattern	LeetCode Problems
Number		
Array / Interval	Greedy	55, 435, 253
Array / Heap	Heap / Priority Queue	215, 347, 295
Array	Cyclic Sort	41, 448, 442
String	Trie	208, 211, 421
Matrix / Graph	Matrix Traversal	48, 733, 200, 130

Generalized Categories of DP Problems

Category	Example Problems	Typical DP Representation
1D DP	Fibonacci, Staircase, Frog Jump	dp[i] depends on dp[i-1], dp[i-2]
2D Grid DP	Unique paths, Min path sum	dp[i][j] from top/left or other neighbors
String DP (2D)	LCS, Edit Distance, Palindromic subseq	dp[i][j] represents relationship of s1[i] & s2[j]
Stock Problems	Max profit with buy/sell decisions	dp[i][buyState] (buyState = 0/1)
LIS / Subsequence Based	Longest increasing subsequence	dp[i] based on previous valid dp[j]
Matrix Chain Multiplication (MCM)	Burst Balloons, Boolean Parenthesization	dp[i][j] represents a subarray/subexpression
Partition / Subset DP	Subset sum, Equal partition,	dp[index][target] or dp[target]

Category	Example Problems	Typical DP Representation
	Knapsack	
Bitmask DP	Travelling Salesman, assignment problems	dp[mask][pos]
Tree DP	Diameter, maximum path sum	dp[node] combines results from child nodes
Digit DP	Count numbers with certain properties	dp[pos][tight][sum] etc.
State Compression / Game DP	XOR game, Nim game	State = encoded variables