# 1 CheatSheet: LeetCode Common Templates & Common Code Problems Interview

- PDF Link: cheatsheet-leetcode-A4.pdf, Category: interview
- Blog URL: `https://cheatsheet.dennyzhang.com/cheatsheet-leetcode-A4`
- Related posts: CheatSheet: System Design For Job Interview, #denny-cheatsheets

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- CheatSheet: Common Code Problems & Follow-ups

## 1.1 Top 25 Code Templates

| Num | Category/Tag | Example |
|---|---|---|
| 1 | #bfs | Leetcode: Max Area of Island |
| 2 | #dfs | LeetCode: Surrounded Regions |
| 3 | #binarysearch | LeetCode: Search Insert Position |
| 4 | #interval, #mergelist | LeetCode: Interval List Intersections |
| 5 | #twopointer, #array | LeetCode: Reverse Words in a String II |
| 6 | #twopointer | LeetCode: Two Sum |
| 7 | #backtracking, #subset | LeetCode: Subsets II |
| 8 | #linkedlist, #presum | LeetCode: Remove Zero Sum Consecutive Nodes from Linked List |
| 9 | #unionfind | LeetCode: Accounts Merge |
| 10 | #trie | LeetCode: Longest Word in Dictionary |
| 11 | #stack | LeetCode: Valid Parentheses |
| 12 | #stack | LeetCode: Reverse Substrings Between Each Pair of Parentheses |
| 13 | #heap | LeetCode: Top K Frequent Elements |
| 14 | #baseconversion | LeetCode: Base 7, LeetCode: Convert to Base -2 |
| 15 | #interval | LeetCode: Meeting Rooms II, LeetCode: My Calendar I |
| 16 | #monotone | LeetCode: Daily Temperatures |
| 17 | #knapsack | LeetCode: Coin Change |
| 18 | #sortbyfunction | LeetCode: Relative Sort Array |
| 19 | #slidingwindow | LeetCode: Longest Substring Without Repeating Characters |
| 20 | #editdistance, #dynamicprogramming | LeetCode: Longest Common Subsequence |
| 21 | #twopointer, #mergetwolist | LeetCode: Merge Sorted Array |
| 22 | #topologicalsort | LeetCode: Course Schedule |
| 23 | #bfs, bidirectional bfs | LeetCode: Word Ladder |
| 24 | #monotonicfunc, #binarysearch | LeetCode: Kth Smallest Number in Multiplication Table |
| 25 | #divideconquer, #recursive | Leetcode: Count of Smaller Numbers After Self |
| 26 | #linesweep | Leetcode: Employee Free Time, Leetcode: The Skyline Problem |

https://raw.githubusercontent.com/dennyzhang/cheatsheet.dennyzhang.com/master/cheatsheet-leetcode-A4/datastructre.png

## 1.2 Top 30 Graph Problems

| Num | Problem | Summary |
|---|---|---|
| 1 | Graph Connectivity: Count islands in a 2D matrix | LeetCode: Number of Islands, LeetCode: Isl |
| 2 | Get the size of the largest island | LeetCode: Max Area of Island |
| 3 | Find shortest distance for two nodes in an undirected graph | |
| 4 | Cycle detection in a directed graph | LeetCode: Redundant Connection II |
| 5 | Detect all cycles in a directed graph | LeetCode: Find Eventual Safe States |
| 6 | Whether a graph is a tree | LeetCode: Graph Valid Tree |
| 7 | Minimum Spanning Tree(MST) of a weighted graph - Kruskal's algorithm | LeetCode: Connecting Cities With Minimum |
| 8 | Find shortest paths in a weighted graph - Floyd-Warshall algorithm | |
| 9 | Shortest path for two nodes in a weighted graph - Dijkstra's algorithm | LeetCode: Connecting Cities With Minimum |
| 10 | Update a specific region | LeetCode: Flood Fill |
| 11 | Update regions for a given rule | LeetCode: Surrounded Regions |
| 12 | Number of Distinct Islands | LeetCode: Number of Distinct Islands |
| 13 | Mark levels | LeetCode: 01 Matrix |
| 14 | Diameter of a tree in graph theory | LeetCode: Tree Diameter |
| 15 | Duplicate edges | LeetCode: Reconstruct Itinerary |
| 16 | Find a certain node in a graph | LeetCode: Find the Celebrity |
| 17 | Coloring graph | LeetCode: Minesweeper |
| 18 | Find a certain path from source to destination in a graph | LeetCode: Path With Maximum Minimum V |
| 19 | Find the minimum steps from point1 to point2 | LeetCode: Word Ladder, LeetCode: Sliding |
| 20 | Find all minimum paths from point1 to point2 | LeetCode: Word Ladder II |
| 21 | All Paths from Source Lead to Destination | LeetCode: All Paths from Source Lead to De |
| 22 | Node connectivity problem for a sparse 2D matrix | LeetCode: Escape a Large Maze |
| 23 | Bricks Falling When Hit | LeetCode: Bricks Falling When Hit |
| 24 | Bridges in a connected graph - Tarjan's algorithm | LeetCode: Critical Connections in a Network |
| 25 | Valid & Invalid moves | LeetCode: Alphabet Board Path |
| 26 | Move in different directions: 4 directions, 8 directions | LeetCode: Queens That Can Attack the Kin |
| 27 | String Transforms Into Another String | LeetCode: String Transforms Into Another S |

https://cdn.dennyzhang.com/images/brain/denny$_{\text{leetcode.png}}$

## 1.3 Top 20 Binarysearch Problems

| Num | Problem | Summary |
|---|---|---|
| 1 | Find whether target in the range | LeetCode: Guess Number Higher or Lower |
| 2 | Find the first target with duplicates | LeetCode: First Bad Version |
| 3 | Find the last target with duplicates | LeetCode: Longest Repeating Substring |
| 4 | Search Insert Position | LeetCode: Search Insert Position, LeetCode: Time Based Key-Value Sto |
| 5 | Missing Element in Sorted Array | LeetCode: Missing Element in Sorted Array |
| 6 | Find smallest letter greater than target | LeetCode: Find Smallest Letter Greater Than Target |
| 7 | Random Point in Non-overlapping Rectangles | LeetCode: Random Point in Non-overlapping Rectangles |
| 8 | Binary search on monotonic function | LeetCode: Sqrt(x), LeetCode: Capacity To Ship Packages Within D Day |
| 9 | Place k elements to minimize max distance | LeetCode: Minimize Max Distance to Gas Station |
| 10 | Kth Smallest Number in Multiplication Table | LeetCode: Kth Smallest Number in Multiplication Table |
| 11 | Search for a Range | Leecode: Search for a Range |
| 12 | Mountain Array | LeetCode: Peak Index in a Mountain Array |
| 13 | Dynamic programming with binary search | LeetCode: Maximum Profit in Job Scheduling |
| 14 | Montone stack with binary search | LeetCode: Maximum Width Ramp |
| 15 | Find Right Interval | Leecode: Find Right Interval |
| 16 | Patient sort | LeetCode: Longest Increasing Subsequence |
| 17 | Find Minimum in Rotated Sorted Array | LeetCode: Find Minimum in Rotated Sorted Array |
| 18 | Find Minimum in Rotated Sorted Array II | LeetCode: Find Minimum in Rotated Sorted Array II |

## 1.4 Top 25 Dynamic Programming Problems

| Num | Problem | Time Complexity | Summary |
|---|---|---|---|
| 1 | Maximum subarray problem - Kadane's algorithm | O(n) | LeetCode: Maximum Subarray |
| 2 | LIS - Longest increasing subsequence | O(n) | LeetCode: Longest Increasing Subsequence |
| 3 | LCS - Longest Common Subsequence | O(n*m) | LeetCode: Longest Common Subsequence |
| 4 | LPS - Longest Palindromic Subsequence | O(n) | LeetCode: Longest Palindromic Subsequence |
| 5 | Longest Palindromic Substring | $O(n^2)$ | LeetCode: Longest Palindromic Substring |
| 6 | Edit distance of two strings | $O(n^2)$ | LeetCode: Edit Distance |
| 7 | Maximum profits with certain costs | $O(n^2)$ | LeetCode: 4 Keys Keyboard |
| 8 | Count of distinct subsequence | O(n) | LeetCode: Distinct Subsequences II |
| 9 | Count out of boundary paths in a 2D matrix | O(n*m*N) | LeetCode: Out of Boundary Paths |
| 10 | Regular Expression Matching | O(n*m) | LeetCode: Regular Expression Matching |
| 11 | Wildcard Matching | O(n*m) | LeetCode: Wildcard Matching |
| 12 | Multiple choices for each step | O(n*m) | LeetCode: Filling Bookcase Shelves |
| 13 | Knapsack: put array to bag A, B or discard it | O(n*s) | LeetCode: Tallest Billboard |
| 14 | Knapsack problem to maximize benefits | O(n*s) | LeetCode: Coin Change |
| 15 | Minimum Cost to Merge Stones | $O(n^3)$ | LeetCode: Minimum Cost to Merge Stones |
| 16 | DP over interval: Minimum-weight triangulation | $O(n^3)$ | LeetCode: Minimum Score Triangulation of Poly |
| 17 | Burst Balloons | $O(n^3)$ | LeetCode: Burst Balloons |
| 18 | Remove Boxes | $O(n^4)$ | LeetCode: Remove Boxes |
| 19 | Largest Sum of Averages | O(k*n*n) | LeetCode: Largest Sum of Averages |
| 20 | Uncrossed Lines | O(n*m) | LeetCode: Uncrossed Lines |
| 21 | Binary Trees With Factors | $O(n^2)$ | LeetCode: Binary Trees With Factors |

## 1.5 Top 15 BinaryTree Problems

| Num | Problem | Summary |
|---|---|---|
| 1 | Binary Tree Level Order Traversal | LeetCode: Binary Tree Right Side View |
| 2 | Get binary tree height, width | LeetCode: Balanced Binary Tree |
| 3 | LCA - Lowest Common Ancestor of a binary Tree | LeetCode: Lowest Common Ancestor of a Binary Tree |
| 4 | Validate Binary Search Tree | LeetCode: Validate Binary Search Tree |
| 5 | Construct binary tree | LeetCode: Construct Binary Tree from Preorder and Postorder Trav |
| 6 | Distribute Coins in Binary Tree | LeetCode: Distribute Coins in Binary Tree |
| 7 | Binary Tree Vertical Order Traversal | LeetCode: Binary Tree Vertical Order Traversal |
| 8 | Verify Preorder Sequence in Binary Search Tree | LeetCode: Verify Preorder Sequence in Binary Search Tree |
| 9 | Recursive + Greedy | LeetCode: Binary Tree Coloring Game |
| 10 | Binary tree + greedy | LeetCode: Binary Tree Cameras |

## 1.6 Top 10 String Problems

| Num | Problem | Summary |
|---|---|---|
| 1 | Edit distance of two strings | LeetCode: Edit Distance |
| 2 | Remove duplicate letters | Remove Duplicate Letters |
| 3 | Word ladder | LeetCode: Word Ladder |
| 4 | lrs - Longest repeating substring | LeetCode: Longest Repeating Substring |
| 5 | Remove Comments | LeetCode: Remove Comments |
| 6 | Split Concatenated Strings | LeetCode: Split Concatenated Strings |
| 7 | Vowel Spellchecker | LeetCode: Vowel Spellchecker |
| 8 | Lexicographically minimal string rotation | LeetCode: Last Substring in Lexicographical Order |
| 9 | String Transforms Into Another String | LeetCode: String Transforms Into Another String |
| 10 | Find the Closest Palindrome | LeetCode: Find the Closest Palindrome |

## 1.7 Top 5 Array Problems

| Num | Problem | Summary |
|---|---|---|
| 1 | Transpose Matrix | LeetCode: Transpose Matrix |
| 2 | Largest 1-Bordered Square | LeetCode: Largest 1-Bordered Square |
| 3 | Alphabet Board Path | LeetCode: Alphabet Board Path |
| 4 | Set Mismatch | LeetCode: Set Mismatch |
| 5 | Majority Element | LeetCode: Majority Element |

### 1.8 Top 5 Linkedlist Problems

| Num | Problem | Summary |
|---|---|---|
| 1 | Merge k Sorted Lists | LeetCode: Merge k Sorted Lists |
| 2 | Detect cycle for a linked list | LeetCode: Linked List Cycle |
| 3 | LFU cache with double linkedlist | LeetCode: LFU Cache |

### 1.9 Top 10 Sliding Window Problems

| Num | Problem | Summary |
|---|---|---|
| 1 | Sliding window with fixed size | LeetCode: Find All Anagrams in a String |
| 2 | Sliding window with non-decreasing size | LeetCode: Max Consecutive Ones III |
| 3 | How to initialize the time window? | LeetCode: Minimum Swaps to Group All 1's Together |
| 4 | Sliding window with non-decreasing size | LeetCode: Max Consecutive Ones III |
| 5 | Move two pointers: two loop vs One loop | LeetCode: Longest Substring Without Repeating Characte |
| 6 | Inspiring sliding window problem | LeetCode: Moving Stones Until Consecutive II |
| 7 | Sliding window with adjustable size | |
| 8 | Move pointer1 to match the other, or the other way around | |

### 1.10 Top 10 Math Problems

| Num | Problem | Summary |
|---|---|---|
| 1 | Check prime - Sieve of Eratosthenes | LeetCode: Count Primes |
| 2 | Check leap year | LeetCode: Day of the Week |
| 3 | GCD | LeetCode: Fraction Addition and Subtraction |
| 4 | Overlapping area of two rectangles | LeetCode: Rectangle Area |
| 5 | Rotate Array by k steps | LeetCode: Rotate Array |
| 6 | Mapping data range of getRand algorithm | LeetCode: Implement Rand10() Using Rand7() |
| 7 | Deal with float | LeetCode: Minimize Max Distance to Gas Station |
| 8 | Sum of Subsequence Widths | LeetCode: Sum of Subsequence Widths |
| 9 | Reduce f(x, y) to g(x) | Leetcode: Maximum of Absolute Value Expression |
| 10 | Remove 9 | LeetCode: Remove 9 |
| 11 | Fraction to Recurring Decimal | LeetCode: Fraction to Recurring Decimal |
| 12 | Check if two line segments intersect | |

### 1.11 Top 10 Greedy Problems

| Num | Problem | Summary |
|---|---|---|
| 1 | Next Permutation | LeetCode: Next Permutation |
| 2 | Split Array into Consecutive Subsequences | LeetCode: Split Array into Consecutive Subsequences |
| 3 | Remove duplicate letters | Remove Duplicate Letters |
| 4 | Bag of Tokens | LeetCode: Bag of Tokens |
| 5 | Two City Scheduling | LeetCode: Two City Scheduling |
| 6 | Split Concatenated Strings | LeetCode: Split Concatenated Strings |
| 7 | Jump Game II | LeetCode: Jump Game II |
| 8 | Delete Columns to Make Sorted II | LeetCode: Delete Columns to Make Sorted II |

### 1.12 Top 5 Trie Problems

| Num | Problem | Summary |
|---|---|---|
| 1 | Extra datastructure in trie to save caculation | LeetCode: Word Search II |
| 2 | Trie for bit manipulation | LeetCode: Maximum XOR of Two Numbers in an Array. |
| 3 | Fuzzy match for trie tree | LeetCode: Implement Magic Dictionary |

### 1.13 Top 5 Union Find Problems

| Num | Problem | Summary |
|---|---|---|
| 1 | Union find for weighted graph | LeetCode: Evaluate Division |
| 2 | Union find: connect groups and merge node count | LeetCode: Bricks Falling When Hit |

## 1.14 Top 5 Heap/Priority Queue Problems

| Num | Problem | Summary |
|---|---|---|
| 1 | Meeting Rooms II | LeetCode: Meeting Rooms II |
| 2 | Task Scheduler | LeetCode: Task Scheduler |
| 3 | Last Stone Weight | LeetCode: Last Stone Weight |
| 4 | The Skyline Problem | LeetCode: The Skyline Problem |

## 1.15 Top 5 Montone Stack/Queue Problems

| Num | Problem | Summary |
|---|---|---|
| 1 | Monotone stack for consecutive subarrays | LeetCode: Online Stock Span, LeetCode: Sum of Subarray Minimums |
| 2 | Shortest Subarray with Sum at Least K | LeetCode: Shortest Subarray with Sum at Least K |

## 1.16 Top 10 Backtracking Problems

| Num | Problem | Summary |
|---|---|---|
| 1 | Generate unique permutation | LeetCode: Permutations II |
| 2 | Permutation: All elements must take | LeetCode: Pyramid Transition Matrix |
| 3 | Combination: All elements can take or don't take | LeetCode: Subsets II |
| 4 | Expression Add Operators | LeetCode: Expression Add Operators |
| 5 | Permutation vs Combination | LeetCode: Campus Bikes II |
| 6 | Define dfs backtracking function | LeetCode: Verbal Arithmetic Puzzle |

## 1.17 Top 20 Object-Oriented Design Problems

| Num | Problem | Example |
|---|---|---|
| 1 | Cache | LeetCode: LRU Cache, LeetCode: LFU Cache, LeetCode: All O‘one Data Structure |
| 2 | Throttling | LeetCode: Design Hit Counter, LeetCode: Logger Rate Limiter |
| 3 | Design Log Storage System | LeetCode: Design Log Storage System |
| 4 | Linked List with random access | LeetCode: Design Linked List |
| 5 | Max Stack | LeetCode: Max Stack |
| 6 | Design HashMap | LeetCode: Design HashMap |
| 7 | Circular Queue | LeetCode: Design Circular Queue, LeetCode: Design Circular Deque |
| 8 | Trie tree | LeetCode: Implement Trie (Prefix Tree), LeetCode: Add and Search Word |
| 9 | Get Median | LeetCode: Find Median from Data Stream |
| 10 | Range Sum Query | LeetCode: Range Sum Query - Mutable, LeetCode: Range Sum Query - Immutable |
| 11 | Design File System | LeetCode: Design File System |
| 12 | Tree Iterator | LeetCode: Binary Search Tree Iterator |
| 13 | String Iterator | LeetCode: Design Compressed String Iterator |
| 14 | ZigZag Iterator | LeetCode: Zigzag Iterator |
| 15 | Insert Delete GetRandom O(1) | LeetCode: Insert Delete GetRandom O(1) |
| 16 | Insert Delete GetRandom O(1) II | LeetCode: Insert Delete GetRandom O(1) - Duplicates allowed |
| 17 | Random Pick with Blacklist | LeetCode: Random Pick with Blacklist |

## 1.18 Top 50 General Problems

| Num | Problem | Example |
|---|---|---|
| 1 | Longest substring with at most K distinct characters | LeetCode: Longest Substring with At Most K Distinct Character |
| 2 | Longest subarray with maximum K 0s | LeetCode: Max Consecutive Ones III |
| 3 | Seperate a list into several groups | LeetCode: Summary Ranges |
| 4 | Split string | LeetCode: License Key Formatting |
| 5 | TopK problem | LeetCode: Top K Frequent Elements, LeetCode: Find K Pairs w |
| 6 | Longest Palindromic Subsequence | LeetCode: Longest Palindromic Subsequence |
| 7 | Sort one array based on another array | LeetCode: Relative Sort Array |
| 8 | Range update with lazy propagation | LeetCode: Corporate Flight Bookings |
| 9 | Get all possibilities of subsets | LeetCode: Subsets II, LeetCode: Subsets |
| 10 | Choose k numbers from a list | LeetCode: Combination Sum II |
| 11 | Combination from multiple segments | LeetCode: Letter Combinations of a Phone Number |
| 12 | Remove nodes from linked list | LeetCode: Remove Zero Sum Consecutive Nodes from Linked Lis |
| 13 | Two pointers | LeetCode: Two Sum |
| 14 | Buy stock for maximum profit list | LeetCode: Best Time to Buy and Sell Stock |
| 15 | Prefix search from a list of strings | LeetCode: Longest Word in Dictionary |
| 16 | Factor Combinations | LeetCode: Factor Combinations |
| 17 | Permutation without duplicates | LeetCode: Palindrome Permutation II |
| 18 | Convert a number into negative base representation | LeetCode: Convert to Base -2 |
| 19 | Network connectivity | LeetCode: Friend Circles |
| 20 | Build relationship among different sets | LeetCode: Accounts Merge |
| 21 | Find the next greater value | LeetCode: Daily Temperatures |
| 22 | Meeting conflict | LeetCode: Meeting Rooms, LeetCode: Course Schedule |
| 23 | Minimum conference rooms | LeetCode: Meeting Rooms II |
| 24 | Quick slow pointers | LintCode: Middle of Linked List |
| 25 | Longest Repeating Character with at most K changes | LeetCode: Longest Repeating Character Replacement |
| 26 | Prefix and Suffix Search | LeetCode: Prefix and Suffix Search |
| 27 | Remove duplicate letters | LeetCode: Remove Duplicate Letters |
| 28 | Beautiful array | LeetCode: Beautiful Array |
| 29 | Whether 132 pattern exists in array | LeetCode: 132 Pattern |
| 30 | Detect conflicts of intervals | LeetCode: Non-overlapping Intervals |
| 31 | Segment tree: solves range query problems quickly | LeetCode: Range Sum Query - Mutable |
| 32 | Find best meeting points for a list of nodes | LeetCode: Best Meeting Point |
| 33 | Find the size of longest wiggle subsequence | LeetCode: Wiggle Subsequence |
| 34 | Sequence reconstruction | LeetCode: Sequence Reconstruction |
| 35 | Construct Binary Tree from String | Construct Binary Tree from String |
| 36 | Use more space to save time | LeetCode: Min Stack |
| 37 | Min max game problems | LeetCode: Predict the Winner, LeetCode: Stone Game |
| 38 | Shortest Subarray with Sum at Least K | LeetCode: Shortest Subarray with Sum at Least K |
| 39 | Wiggle sort | LeetCode: Wiggle Sort II |
| 40 | Array compressed storage | LeetCode: Design Tic-Tac-Toe |
| 41 | Dead lock: the Dining Philosophers | LeetCode: The Dining Philosophers |
| 42 | Maintain the order | LeetCode: Building H2O |
| 43 | Int to string or string to int | |
| 44 | Expression Add Operators | LeetCode: Expression Add Operators |
| 45 | Merge k Sorted Lists | LeetCode: Merge k Sorted Lists |
| 46 | Trapping Rain Water | LeetCode: Trapping Rain Water |

## 1.19 Basic Thinking Methodologies

| Num | Name | Summary |
|---|---|---|
| 1 | Trial and error | |
| 2 | Divide and Conquer | |
| 3 | Start with naive algorithm, then identify useless steps | |

## 1.20 Tips: Think From The Other Direction

| Num | Name | Summary |
|---|---|---|
| 1 | In graph, instead of deleting edges, add edge in reverse | LeetCode: Bricks Falling When Hit |
| 2 | Instead of BFS from empty to islands, do the otherwise | LeetCode: As Far from Land as Possible |
| 3 | Treat each point as the last item, instead of the first | LeetCode: Burst Balloons |
| 4 | Avoid deleting element from hashmaps | |

## 1.21 Common Tips For Clean Code

| Num | Name | Summary |
|---|---|---|
| 1 | Calculate sum of a range quickly | #presum,LeetCode: Maximum Subarray |
| 2 | Move in four directions for a matrix | LeetCode: Sliding Puzzle |
| 3 | Split string by multiple separators | LeetCode: Brace Expansion |
| 4 | Add a dummy tailing element to simplify code | LeetCode: Brace Expansion |
| 5 | Fast slow pointers | LintCode: Middle of Linked List |
| 6 | Deep copy an array | LeetCode: Combination Sum |
| 7 | Use arrays instead of hashmaps, if possible | LeetCode: Number of Days in a Month |
| 8 | Control the order of dfs | LeetCode: Subsets II |
| 9 | Avoid inserting into the head of an array | LeetCode: Path In Zigzag Labelled Binary Tree |
| 10 | From right to left, instead of left to right | LeetCode: Merge Sorted Array |
| 11 | Think the other way around | `Add Items` vs `Remove Items`, `Increase Counter` |
| 12 | Avoid unnecessary if...else... | res[i] = (diff/2 <= k), LeetCode: Can Make Pali |
| 13 | To get the case of K, solve: at most K - at most (K-1) | LeetCode: Subarrays with K Different Integers |
| 14 | Instead of deleting entry from hashmap, decrease counter | LeetCode: Longest Substring with At Most K Dis |
| 15 | Find the max/min; If not found, return 0 | LeetCode: Minimum Area Rectangle |
| 16 | With helper function vs without helper function | LeetCode: Longest Repeating Character Replacer |
| 17 | Instead of adding a character, try to delete one | LeetCode: Longest String Chain |
| 18 | #roudtrippass: from left to right, then right to left | LeetCode: Shortest Distance to a Character |
| 19 | Delayed calculation to simplify the code | LeetCode: Interval List Intersections |
| 20 | Instead of removing, add padding elements | LeetCode: Duplicate Zeros |
| 21 | Initialize array with n+1 length to simplify code | LeetCode: Range Addition |
| 22 | Look for off-by-one errors, sometimes use i+1<len(l) vs i<len(l) | LeetCode: Previous Permutation With One Swap |
| 23 | Hashmap can reduce calculation, but may complicate things too | LeetCode: Maximum Frequency Stack |
| 24 | Sliding window to get the longest size of subarray | LeetCode: Max Consecutive Ones III |
| 25 | In matrix dfs, change cell to impossible value to avoid state hashmap | LeetCode: Word Search II |
| 26 | For palindrome check, check the whole string, instead of left half | LeetCode: Longest Chunked Palindrome Decomp |
| 27 | Use queue to keep flipping the orders | LeetCode: Zigzag Iterator |
| 28 | Find a pair with sum meets some requirements | LeetCode: Two Sum |
| 29 | Add a dummy head node for linked list | LeetCode: Reverse Linked List |
| 30 | Hide details which are irrelevant | |
| 31 | One pass instead of two pass | |
| 32 | Avoid unnecessary precheck | |

## 1.22 Whiteboard Tips

| Name | Summary |
|---|---|
| Focus on your key motivations or thinkings | Pivot quickly from interviewers' feedback |
| Brute force algorithm add values | Intuitive algorithms are usually the starting points of optimal ones |
| Work through specific test case clearly | Reduce bugs, and help to obtain interviewers' feedback early |
| Naming variables could be tricky | Settle down a set of variables per your preference |
| You don't have to crack all problems/optimal algorithms | |

## 1.23 More Data Structure

| Name | Summary |
|---|---|
| Tree map | |
| Inverted Index | |

## 1.24 Resource For Code Problems

| Name | Summary |
|---|---|
| Leetcode summary | Link: Top Google Questions, Link: Top 100 Liked Questions, Link: Top Interview Questions |
| Leetcode summary | GitHub: kdn251/interviews, Github: Algorithms-and-Coding-Interviews |
| YouTube | How to: Work at Google - Example Coding/Engineering Interview, lee 215, Aoxiang Cui, happygirlzt |
| Online test websites | hihocoder.com, codeforces.com, spoj.com, Google - codejam, hackerrank.com |
| Online test websites | hackerrank - hard, poj.org, acm.hdu.edu.cn, acm.zju.edu.cn, acm.timus.ru, uva.onlinejudge.org |
| visualgo | visualizing data structures and algorithms through animation |
| Reference | geeksforgeeks.org, Youtube: Abdul Bari - Algorithm |
| Reference | COS 423 Theory of Algorithms |

## 1.25 More Resources



```
https://en.wikipedia.org/wiki/Data_structure
https://www.cs.princeton.edu/~rs/AlgsDS07/
https://www.geeksforgeeks.org/top-10-algorithms-in-interview-questions/
```