

String Problems

1. Reverse a string
2. Check if a string is a palindrome
3. Count vowels/consonants in a string
4. Find the first non-repeating character
5. Convert string to lowercase/uppercase
6. Remove whitespace from a string
7. Count occurrences of a specific character
8. Check if two strings are anagrams
9. Find all permutations of a string
10. Longest substring without repeating characters
11. String compression (e.g., "aabcccccaaa" -> "a2b1c5a3")
12. Implement strstr() (find substring)
13. String to integer conversion (atoi)
14. Group anagrams from a list of strings
15. Longest common prefix among array of strings
16. Valid parentheses (balanced brackets)
17. Minimum window substring
18. Encode and decode strings (for serialization)

Array Problems

1. Find min/max in array
2. Reverse an array
3. Rotate array by k positions
4. Find duplicates in array
5. Remove duplicates from sorted array
6. Merge two sorted arrays
7. Find missing number in sequence

8. Find all pairs with given sum
9. Find majority element (appears $> n/2$ times)
10. Move all zeros to end of array
11. Maximum subarray sum (Kadane's algorithm)
12. Product of array except self
13. Find first missing positive integer
14. Find all duplicates in array ($O(n)$ time, $O(1)$ space)
15. Container with most water
16. Trapping rain water problem
17. Sliding window maximum
18. Merge intervals
19. Insert interval
20. Search in rotated sorted array
21. Find peak element
22. 3Sum/4Sum problems
23. Next permutation
24. Spiral matrix traversal
25. Pascal's triangle generation

Loop Problems

1. Print patterns (pyramids, diamonds, etc.)
2. Multiplication table generation
3. Sum of digits in a number
4. Factorial calculation
5. Fibonacci sequence generation
6. Check if number is prime
7. Find all prime numbers up to N (Sieve of Eratosthenes)
8. Armstrong number check

9. Perfect number check
10. Binary to decimal conversion and vice versa
11. Bubble sort implementation
12. Selection sort implementation
13. Insertion sort implementation
14. Print all pairs in array
15. Find common elements in multiple arrays
16. Matrix multiplication
17. Transpose a matrix
18. Rotate a matrix by 90 degrees

Combined Problems

1. Count frequency of each character in string
2. Find longest word in string
3. Capitalize first letter of each word
4. Word frequency counter
5. Find all anagrams in a string
6. Group words by same set of characters
7. Check if string can be rearranged to form palindrome
8. Longest substring with at most K distinct characters
9. String segmentation (break into dictionary words)
10. Find smallest window containing all characters of another string

Algorithmic Challenges

1. Implement binary search
2. Implement linear search
3. Implement various sorting algorithms
4. Implement stack/queue using arrays
5. Implement hash table basics

6. Two pointer technique problems
7. Prefix sum array problems
8. Dutch national flag problem (sort 0s, 1s, 2s)
9. Stock buy/sell problems (max profit)
10. Kadane's algorithm variations