DSA

Assignment Questions

PW SKILLS

Problem 1: Reverse a singly linked list.

Input: 1 -> 2 -> 3 -> 4 -> 5
Output: 5 -> 4 -> 3 -> 2 -> 1

Problem 2: Merge two sorted linked lists into one sorted linked list.

Input: List 1: 1 -> 3 -> 5, List 2: 2 -> 4 -> 6
Output: 1 -> 2 -> 3 -> 4 -> 5 -> 6

Problem 3: Remove the nth node from the end of a linked list.

Input: 1 -> 2 -> 3 -> 4 -> 5, n = 2
Output: 1 -> 2 -> 3 -> 5

Problem 4: Find the intersection point of two linked lists.

Input: List 1: 1 -> 2 -> 3 -> 4, List 2: 9 -> 8 -> 3 -> 4
Output: Node with value 3

Problem 5: Remove duplicates from a sorted linked list.

Input: 1 -> 1 -> 2 -> 3 -> 3
Output: 1 -> 2 -> 3

Problem 6: Add two numbers represented by linked lists (where each node contains a single digit).

Input: List 1: 2 -> 4 -> 3, List 2: 5 -> 6 -> 4 (represents 342 + 465)
Output: 7 -> 0 -> 8 (represents 807)

Problem 7: Swap nodes in pairs in a linked list.

Input: 1 -> 2 -> 3 -> 4
Output: 2 -> 1 -> 4 -> 3

Problem 8: Reverse nodes in a linked list in groups of k.

Input: 1 -> 2 -> 3 -> 4 -> 5, k = 3
Output: 3 -> 2 -> 1 -> 4 -> 5

Problem 9: Determine if a linked list is a palindrome.

Input: 1 -> 2 -> 2 -> 1
Output: True

Problem 10: Rotate a linked list to the right by k places.

Input: 1 -> 2 -> 3 -> 4 -> 5, k = 2
Output: 4 -> 5 -> 1 -> 2 -> 3

Problem 11: Flatten a multilevel doubly linked list.

Input: 1 <-> 2 <-> 3 <-> 7 <-> 8 <-> 11 -> 12, 4 <-> 5 -> 9 -> 10, 6 -> 13
Output: 1 <-> 2 <-> 3 <-> 4 <-> 5 <-> 6 <-> 7 <-> 8 <-> 9 <-> 10 <-> 11 <-> 12 <-> 13

Problem 12: Rearrange a linked list such that all even positioned nodes are placed at the end.

Input: 1 -> 2 -> 3 -> 4 -> 5
Output: 1 -> 3 -> 5 -> 2 -> 4

Problem 13: Given a non-negative number represented as a linked list, add one to it.

Input: 1 -> 2 -> 3 (represents the number 123)
Output: 1 -> 2 -> 4 (represents the number 124)

Problem 14: Given a sorted array and a target value, return the index if the target is found. If not, return the index where it would be inserted.

Input: nums = [1, 3, 5, 6], target = 5
Output: 2

Problem 15: Find the minimum element in a rotated sorted array.

Input: [4, 5, 6, 7, 0, 1, 2]
Output: 0

Problem 16: Search for a target value in a rotated sorted array.

Input: nums = [4, 5, 6, 7, 0, 1, 2], target = 0
Output: 4

Problem 17: Find the peak element in an array. A peak element is greater than its neighbors.

Input: nums = [1, 2, 3, 1]
Output: 2 (index of peak element)

Problem 18: Given a m x n matrix where each row and column is sorted in ascending order, count the number of negative numbers.

Input: grid = [[4, 3, 2, -1], [3, 2, 1, -1], [1, 1, -1, -2], [-1, -1, -2, -3]]
Output: 8

Problem 19: Given a 2D matrix sorted in ascending order in each row, and the first integer of each row is greater than the last integer of the previous row, determine if a target value is present in the matrix.

Input: matrix = [[1, 3, 5, 7], [10, 11, 16, 20], [23, 30, 34, 60]], target = 3
Output: True

Problem 20: Find Median in Two Sorted Arrays
Problem: Given two sorted arrays, find the median of the combined sorted array.

Input: nums1 = [1, 3], nums2 = [2]
Output: 2.0

Problem 21: Given a sorted character array and a target letter, find the smallest letter in the array that is greater than the target.

Input: letters = ['c', 'f', 'j'], target = 'a'
Output: 'c'

Problem 22: Given an array with n objects colored red, white, or blue, sort them in-place so that objects of the same color are adjacent, with the colors in the order red, white, and blue.

Input: nums = [2, 0, 2, 1, 1, 0]
Output: [0, 0, 1, 1, 2, 2]

Problem 23: Find the kth largest element in an unsorted array.

Input: nums = [3, 2, 1, 5, 6, 4], k = 2
Output: 5

Problem 24: Given an unsorted array, reorder it in-place such that nums[0] <= nums[1] >= nums[2] <= nums[3]...

Input: nums = [3, 5, 2, 1, 6, 4]
Output: [3, 5, 1, 6, 2, 4]

Problem 25: Given an array of integers, calculate the sum of all its elements.

Input: [1, 2, 3, 4, 5]
Output: 15

Problem 26: Find the maximum element in an array of integers.

Input: [3, 7, 2, 9, 4, 1]
Output: 9

Problem 27: Implement linear search to find the index of a target element in an array.

Input: [5, 3, 8, 2, 7, 4], target = 8
Output: 2

Problem 28 Calculate the factorial of a given number.

Input: 5
Output: 120 (as 5! = 5 * 4 * 3 * 2 * 1 = 120)

Problem 29: Check if a given number is a prime number.

Input: 7
Output: True

Problem 30: Generate the Fibonacci series up to a given number n.

Input: 8
Output: [0, 1, 1, 2, 3, 5, 8, 13]

Problem 31: Calculate the power of a number using recursion.

Input: base = 3, exponent = 4
Output: 81 (as 3^4 = 3 * 3 * 3 * 3 = 81)

Problem 32: Reverse a given string.

Input: "hello"
Output: "olleh"