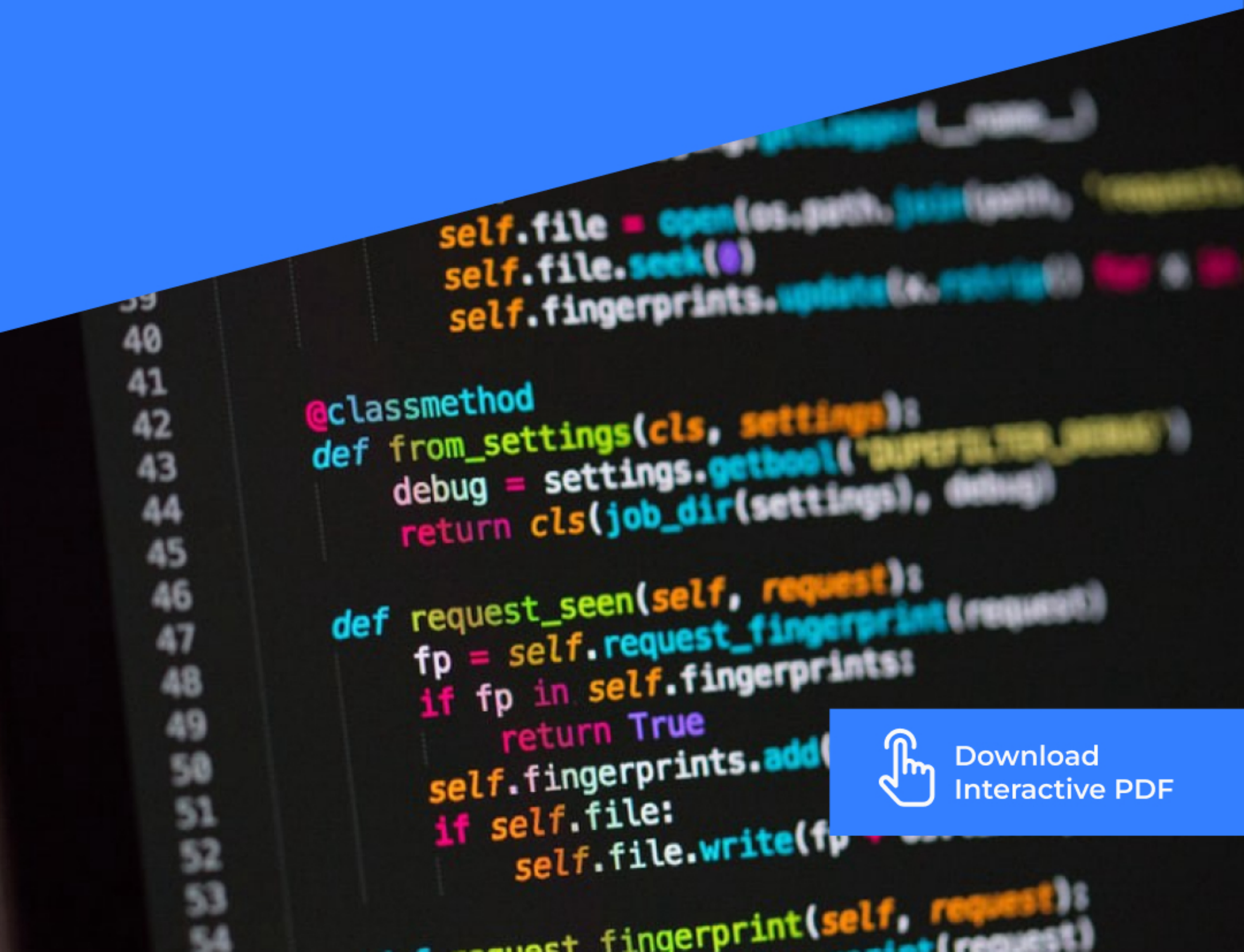
BOSSCODER ACADEMY

100 Questions to Master DSA



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INTRODUCTION

Online resources to practise DSA problems have thousands of questions over a wide range of topics.

For any person, it may become overwhelming with the large amount of problems to cover and the fear of missing out on important questions is always lurking.

Here, we have analysed, shortlisted and compiled a set of 100 questions that will help you gain complete confidence over data structures and algorithms.

However as a disclaimer, you should know that everyone learns differently and at the end of the day, it is not the number of questions that you solve but gaining the ability to analyse, identify and come up with solutions for related problems is what matters.

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ARRAYS

Question 1.

Write a program to reverse an array

Practice Here

Question 2.

Find the kth smallest element in an array in linear time complexity.

Practice Here

Question 3.

Given an integer array arr, find the contiguous subarray (containing at least one number) which has the largest sum and return its sum and print the subarray.

Practice Here

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Question 4.

You are given an array of prices where prices[i] is the price of a given stock on an ith day. You want to maximise your profit by choosing a single day to buy one stock and choosing a different day in the future to sell that stock. Return the maximum profit you can achieve from this transaction. If you cannot achieve any profit, return 0.

Practice Here

Question 5.

Given an array consisting of only 0s, 1s and 2s. Write a program to in-place sort the array without using inbuilt sort functions, in linear time complexity and constant space.

Practice Here

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Question 6.

Given an unsorted array of size n. Array elements are in the range of 1 to n. One number from set {1, 2, ...n} is missing and one number occurs twice in the array. Find these two numbers.

Practice Here

Question 7.

Given an array of integers and an integer target, return indices of the two numbers such that they add up to target.

Practice Here

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Question 8.

You are given an integer array height of length n. There are n vertical lines drawn such that the two endpoints of the ith line are (i, 0) and (i, height[i]). Find two lines that together with the x-axis form a container, such that the container contains the most water. Return the maximum amount of water a container can store.

Practice Here

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STRINGS

Question 1.

Write a function that reverses a string. The input string is given as an array of characters s. You must do this by modifying the input array in-place with O(1) extra memory.

Practice Here

Question 2.

Given a string str of length N, you have to find the number of palindromic subsequences (need not necessarily be distinct) present in the string str.

Practice Here

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Question 3.

Given two strings s and p, return an array of all the start indices of p's anagrams in s.

Practice Here

Question 4.

Given a string s1 and a string s2, write a function to check whether s2 is a rotation of s1.

Practice Here

Question 5.

You are given a string s and an integer k. You can choose any character of the string and change it to any other uppercase English character. You can perform this operation at most k times.

Practice Here

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Question 6.

Given two strings s and t of lengths m and n respectively, return the minimum window substring of s such that every character in t (including duplicates) is included in the window. If there is no such substring, return the empty string "".

Practice Here

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SEARCHING AND SORTING ALGORITHMS

Question 1.

Given an array of integers nums which is sorted in ascending order, and an integer target, write a function to search target in nums. If target exists, then return its index. Otherwise, return -1. You must write an algorithm with O(log n) runtime complexity.

Practice Here

Question 2.

Given two sorted arrays nums1 and nums2 of size m and n respectively, return the median of the two sorted arrays. The overall run time complexity should be O(log (m+n)).

Practice Here

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Question 3.

Given an n x n matrix where each of the rows and columns is sorted in ascending order, return the kth smallest element in the matrix. Note that it is the kth smallest element in the sorted order, not the kth distinct element.
You must find a solution with a memory complexity better than O(n2).

Practice Here

Question 4.

Given an integer array nums and an integer k, return the kth largest element in the array. Note that it is the kth largest element in the sorted order, not the kth distinct element.
You must solve it in O(n) time complexity.

Practice Here

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RECURSION

Question 1.

Given n pairs of parentheses, write a function to generate all combinations of well-formed parentheses.

Practice Here

Question 2.

Given an integer array nums of unique elements, return all possible
Subsets (the power set).
The solution set must not contain duplicate subsets.
Return the solution in any order

Practice Here

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Question 3.

Given an array nums of distinct integers, return all the possible permutations. You can return the answer in any order.

Practice Here

Question 4.

Given a string s, partition s such that every substring of the partition is a palindrome
Return all possible palindrome partitioning of s.

Practice Here

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Question 5.

Given a collection of candidate numbers (candidates) and a target number (target), find all unique combinations in candidates where the candidate numbers sum to target.

Each number in candidates may only be used once in the combination.

Note: The solution set must not contain duplicate combinations.

Practice Here

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HASHING

Question 1.

Given an array of integers nums and an integer target, return indices of the two numbers such that they add up to target.
You may assume that each input would have exactly one solution, and you may not use the same element twice.
You can return the answer in any order.

Practice Here

Question 2.

Given an unsorted integer array nums, return the smallest missing positive integer.
You must implement an algorithm that runs in O(n) time and uses constant extra space.

Practice Here

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Question 3.

Design a data structure that follows the constraints of a Least Recently Used (LRU) cache.

Practice Here

Question 4.

Given an array of strings, group the anagrams together. You can return the answer in any order. An Anagram is a word or phrase formed by rearranging the letters of a different word or phrase, typically using all the original letters exactly once.

Practice Here

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MATRICES AND MULTIDIMENSIONAL ARRAYS

Question 1.

Given an m x n matrix, return all elements of the matrix in spiral order.

Practice Here

Question 2.

Given an m x n integer matrix matrix, if an element is 0, set its entire row and column to 0's.
You must do it in place.

Practice Here

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Question 3.

Determine if a 9 x 9 Sudoku board is valid. Only the filled cells need to be validated according to the following rules:
Each row must contain the digits 1-9 without repetition.
Each column must contain the digits 1-9 without repetition.
Each of the nine 3 x 3 sub-boxes of the grid must contain the digits 1-9 without repetition.

Practice Here

Question 4.

You are given an n x n 2D matrix representing an image, rotate the image by 90 degrees (clockwise). You have to rotate the image in-place, which means you have to modify the input 2D matrix directly. DO NOT allocate another 2D matrix and do the rotation.

Practice Here

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Question 5.

Write an efficient algorithm that searches for a value target in an m x n integer matrix matrix. This matrix has the following properties:
Integers in each row are sorted from left to right.
The first integer of each row is greater than the last integer of the previous row.

Practice Here

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LINKED LIST

Question 1.

Given the head of a singly linked list, reverse the list, and return the reversed list.

Practice Here

Question 2.

Given head, the head of a linked list, determine if the linked list has a cycle in it.
There is a cycle in a linked list if there is some node in the list that can be reached again by continuously following the next pointer. Internally, pos is used to denote the index of the node that tail's next pointer is connected to. Note that pos is not passed as a parameter.
Return true if there is a cycle in the linked list. Otherwise, return false.

Practice Here

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Question 3.

You are given the heads of two sorted linked lists list1 and list2.
Merge the two lists in a one sorted list. The list should be made by splicing together the nodes of the first two lists.
Return the head of the merged linked list.

Practice Here

Question 4.

Given the head of a linked list, remove the nth node from the end of the list and return its head.

Practice Here

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Question 5.

You are given the head of a singly linked-list. The list can be represented as:
L0 → L1 → … → Ln - 1 → Ln
Reorder the list to be on the following form:
L0 → Ln → L1 → Ln - 1 → L2 → Ln - 2 → …
You may not modify the values in the list's nodes. Only nodes themselves may be changed.

Practice Here

Question 6.

Given elements as nodes of the two linked lists. The task is to multiply these two linked lists, say L1 and L2.

Practice Here

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Question 7.

Given the head node of a singly linked list return a pointer to the middle of the linked list.

Practice Here

Question 8.

Given the heads of two singly linked-lists headA and headB, return the node at which the two lists intersect. If the two linked lists have no intersection at all, return null.

Practice Here

Question 9.

Given the head of a singly linked list, return true if it is a palindrome or false otherwise.

Practice Here

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Question 10.

Given the head of a linked list, reverse the nodes of the list k at a time, and return the modified list. k is a positive integer and is less than or equal to the length of the linked list. If the number of nodes is not a multiple of k then left-out nodes, in the end, should remain as it is.
You may not alter the values in the list's nodes, only nodes themselves may be changed.

Practice Here

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BIT MANIPULATION & MATH CONCEPTS

Question 1.

Given an array nums containing n distinct numbers in the range [0, n], return the only number in the range that is missing from the array.

Practice Here

Question 2.

Given an integer n, return an array ans of length n + 1 such that for each i (0 <= i <= n), ans[i] is the number of 1's in the binary representation of i.

Practice Here

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Question 3.

Given a non-empty array of integers nums, every element appears twice except for one. Find that single one.
You must implement a solution with a linear runtime complexity and use only constant extra space.

Practice Here

Question 4.

Given a positive integer N, print count of set bits in it.

Practice Here

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Question 5.

Given two integer arrays nums1 and nums2, return an array of their intersection. Each element in the result must appear as many times as it shows in both arrays and you may return the result in any order.

Practice Here

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STACKS AND QUEUES

Question 1.

Implement a first in first out (FIFO) queue using only two stacks. The implemented queue should support all the functions of a normal queue (push, peek, pop, and empty).

Practice Here

Question 2.

Implement a last-in-first-out (LIFO) stack using only two queues. The implemented stack should support all the functions of a normal stack (push, top, pop, and empty).

Practice Here

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Question 3.

Given an array of integers temperatures represents the daily temperatures, return an array answer such that answer[i] is the number of days you have to wait after the ith day to get a warmer temperature. If there is no future day for which this is possible, keep answer[i] == 0 instead.

Practice Here

Question 4.

Given an array of integers heights representing the histogram's bar height where the width of each bar is 1, return the area of the largest rectangle in the histogram.

Practice Here

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Question 5.

Given n non-negative integers representing an elevation map where the width of each bar is 1, compute how much water it can trap after raining.

Practice Here

Question 6.

Given a string s containing just the characters '(', ')', '{', '}', '[' and ']', determine if the input string is valid.

Practice Here

Question 7.

Given a Queue Q containing N elements. The task is to reverse the Queue. Your task is to complete the function rev(), that reverses the N elements of the queue.

Practice Here

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Question 8.

Given a circular integer array A, return the next greater element for every element in A. The next greater element for an element x is the first element greater than x that we come across while traversing the array in a clockwise manner. If it doesn't exist, return -1 for this element.

Practice Here

Question 9.

Design your implementation of the circular queue. The circular queue is a linear data structure in which the operations are performed based on FIFO (First In First Out) principle, and the last position is connected back to the first position to make a circle. It is also called "Ring Buffer".

Practice Here

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Question 10.

You are given an array of integers nums, there is a sliding window of size k which is moving from the very left of the array to the very right. You can only see the k numbers in the window. Each time the sliding window moves right by one position. Return the max sliding window.

Practice Here

Question 11.

Design a stack that supports push, pop, top, and retrieving the minimum element in constant time.

Practice Here

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Question 12.

You are given an m x n grid where each cell can have one of three values:
0 representing an empty cell,
1 representing a fresh orange, or
2 representing a rotten orange.
Every minute, any fresh orange that is 4-directionally adjacent to a rotten orange becomes rotten.
Return the minimum number of minutes that must elapse until no cell has a fresh orange. If this is impossible, return -1.

Practice Here

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TREES & BINARY SEARCH TREES

Question 1.

Given the root of a binary tree, return its maximum depth.
A binary tree's maximum depth is the number of nodes along the longest path from the root node down to the farthest leaf node.

Practice Here

Question 2.

Given the root of a binary tree, invert the tree, and return its root.

Practice Here

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Question 3.

A path in a binary tree is a sequence of nodes where each pair of adjacent nodes in the sequence has an edge connecting them. A node can only appear in the sequence at most once. Note that the path does not need to pass through the root.
The path sum of a path is the sum of the node's values in the path.
Given the root of a binary tree, return the maximum path sum of any non-empty path.

Practice Here

Question 4.

Given the roots of two binary trees p and q, write a function to check if they are the same or not.
Two binary trees are considered the same if they are structurally identical, and the nodes have the same value.

Practice Here

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Question 5.

Given the root of a binary tree, return the level order traversal of its nodes' values. (i.e., from left to right, level by level).t

Practice Here

Question 6.

Given a binary tree, find the lowest common ancestor (LCA) of two given nodes in the tree.

Practice Here

Question 7.

Given two integer arrays preorder and inorder where preorder is the preorder traversal of a binary tree and inorder is the inorder traversal of the same tree, construct and return the binary tree.

Practice Here

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Question 8.

Given the root of a binary tree, imagine yourself standing on the right side of it, return the values of the nodes you can see ordered from top to bottom.

Practice Here

Question 9.

Given the root of a binary tree, determine if it is a valid binary search tree (BST).

Practice Here

Question 10.

Given the root of a binary search tree, and an integer k, return the kth smallest value (1-indexed) of all the values of the nodes in the tree.

Practice Here

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Question 11.

Given the root of a binary tree, return the zigzag level order traversal of its nodes' values. (i.e., from left to right, then right to left for the next level and alternate between).

Practice Here

Question 12.

Given a binary tree, determine if it is height-balanced

Practice Here

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TRIES

Question 1.

A trie (pronounced as "try") or prefix tree is a tree data structure used to efficiently store and retrieve keys in a dataset of strings. There are various applications of this data structure, such as autocomplete and spellchecker.
Implement the Trie.

Practice Here

Question 2.

Design a data structure that supports adding new words and finding if a string matches any previously added string.

Practice Here

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Question 3.

Given an integer array nums, return the maximum result of nums[i] XOR nums[j], where 0 <= i <= j < n.

Practice Here

Question 4.

Given a string s and a dictionary of strings wordDict, return true if s can be segmented into a space-separated sequence of one or more dictionary words.
Note that the same word in the dictionary may be reused multiple times in the segmentation.

Practice Here

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Question 5.

Given an m x n board of characters and a list of strings words, return all words on the board.
Each word must be constructed from letters of sequentially adjacent cells, where adjacent cells are horizontally or vertically neighboring. The same letter cell may not be used more than once in a word.

Practice Here

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HEAPST

Question 1.

You are given an array of k linked-lists lists, each linked-list is sorted in ascending order.
Merge all the linked-lists into one sorted linked-list and return it.

Practice Here

Question 2.

Given an integer array nums and an integer k, return the k most frequent elements. You may return the answer in any order.

Practice Here

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Question 3.

Given a string s, rearrange the characters of s so that any two adjacent characters are not the same.
Return any possible rearrangement of s or return "" if not possible.

Practice Here

Question 4.

The median is the middle value in an ordered integer list. If the size of the list is even, there is no middle value, and the median is the mean of the two middle values.
Implement the MedianFinder class:

Practice Here

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GRAPHS

Question 1.

Given an m x n 2D binary grid grid which represents a map of '1's (land) and '0's (water), return the number of islands.
An island is surrounded by water and is formed by connecting adjacent lands horizontally or vertically. You may assume all four edges of the grid are all surrounded by water.

Practice Here

Question 2.

Given an m x n binary matrix mat, return the distance of the nearest 0 for each cell.
The distance between two adjacent cells is 1.

Practice Here

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Question 3.

Given a graph, traverse through all the nodes in the graph using Depth First Search and Breadth First Search

Practice Here

Question 4.

Given a weighted graph, implement Dijkstra's shortest path.

Practice Here

Question 5.

Given a weighted, undirected, and connected graph of V vertices and E edges. The task is to find the sum of weights of the edges of the Minimum Spanning Tree

Practice Here

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Question 6.

Given is a 2D adjacency list representation of a graph. Check whether the graph is a Bipartite graph.

Practice Here

Question 7.

Given the root of a Directed graph, check whether the graph contains a cycle if yes then return true, return false otherwise.

Practice Here

Question 8.

Given a Directed Graph with V vertices (Numbered from 0 to V-1) and E edges, Find the number of strongly connected components in the graph.

Practice Here

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Question 9.

An image is represented by an m x n integer grid image where image[i][j] represents the pixel value of the image.
You are also given three integers sr, sc, and color. You should perform a flood fill on the image starting from the pixel image[sr][sc].

Practice Here

Question 10.

Given a graph, find the topological order for the given graph.t

Practice Here

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DYNAMIC PROGRAMMING AND GREEDY

Question 1.

Given an integer array nums, find a subarray that has the largest product, and return the product.

Practice Here

Question 2.

Given an integer array nums, return the length of the longest strictly increasing subsequence

Practice Here

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Question 3.

Given two strings word1 and word2, return the minimum number of operations required to convert word1 to word2.
You have the following three operations permitted on a word:
Insert a character
Delete a character
Replace a character

Practice Here

Question 4.

Given a non-empty array nums containing only positive integers, find if the array can be partitioned into two subsets such that the sum of elements in both subsets is equal.

Practice Here

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Question 5.

You are given an integer array coins representing coins of different denominations and an integer amount representing a total amount of money.
Return the fewest number of coins that you need to make up that amount. If that amount of money cannot be made up by any combination of the coins, return -1.
You may assume that you have an infinite number of each kind of coin.

Practice Here

Question 6.

Given two strings text1 and text2, return the length of their longest common subsequence. If there is no common subsequence, return 0.

Practice Here

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Question 7.

There is a robot on an m x n grid. The robot is initially located at the top-left corner (i.e., grid[0][0]). The robot tries to move to the bottom-right corner (i.e., grid[m - 1][n - 1]). The robot can only move either down or right at any point in time.
Given the two integers m and n, return the number of possible unique paths that the robot can take to reach the bottom-right corner.

Practice Here

Question 8.

Given a string s and a dictionary of strings wordDict, return true if s can be segmented into a space-separated sequence of one or more dictionary words.

Practice Here

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Question 9.

Given a set of N jobs where each job has a deadline and profit associated with it.
Each job takes 1 unit of time to complete and only one job can be scheduled at a time. We earn the profit associated with job if and only if the job is completed by its deadline.
Find the number of jobs done and the maximum profit.

Practice Here

Question 10.

Given weights and values of N items, we need to put these items in a knapsack of capacity W to get the maximum total value in the knapsack.

Practice Here

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