# Take Notes

1. shortest palindrome

2. missing integer

3. question about matrix

4. fall of drop

5. Given the following decoder, write the encoder. (The encoder should be written to compress whenever possible):

p14a8xkpq -> p14akkkkkkkkpq

(8xk gets decoded to kkkkkkkk. The only other requirement is that encodings be unambiguous)

6. Find if a given binary tree has duplicate sub trees. (just two leaf nodes of a parent do not count as subtree in this question).

7. Convert strings like aabbcccc to string like a2b2c4?

8. Write code to check a String is palindrome or not?

9. Given a group of 2D points. Write a function to find whether there is any vertical line that can separate the group of points into 2 symmetric groups.

10. Given an integer array, count how many unique pairs in this array larger than a specific value.

Follow-up: how many unique triples larger than a specific value.

11. Given a binary search tree, write a function k-th smallest to find the k-th smallest element in it.

Follow up: what if the BST is modified (insert/delete operations) often and you need to find the k-th smallest frequently? How would you optimize the k-th…

12. Merging overlapping intervals

13. Given a list of words and an abbreviation, I have to write a function which returns true or false about whether the abbreviation maps to exactly one word or not

14. merge k sorted list

15. Maximize ad revenue given a set of of advertisements with a start time, end time and total revenue

16. Museum Problem : Given a 2D grid of rooms which can be closed, open with no guard, or open with a guard. Return a grid with each square labeled with the distance to the nearest guard.

17. Give a list of coordinates, find horizontal symmetric line.

18. Write two functions: Given a n by n grid, (A) add a land at location (x,y) and (B) find the number of islands where an island is a group of adjacent lands.

19. 2-1. Given a set of numbers, find a subset of the numbers whose sum is equal to the sum of the complement set.

20. 2-2. Given a sequence of numbers, find a subsequence whose sum is the largest.

21. 3. Given a pre-order and a in-order traversals of a tree, reconstruct the tree.

22. 4. Given a 32bit sequence, find one in the most significant bit.

23. You are given a collection of M arrays with N integers. Every array is sorted. Develop an algorithm to combine each array into one sorted array.

24. Model raindrops falling on a sidewalk (sidewalk is 1m and raindrops are 1cm if I remember correctly). How could we know when the sidewalk is completely wet.

25. Given list and number get the sub lists that has sum of given number

26. Find duplicate elements from an array

27. How about in a very large file that can't load to memory.

28. Implement the BigInt() class in python.

29. give you two strings S and T, find the shortest string in S which contains all the characters in T.

30. Switch Roma Number to decimal number.

31. Find the second largest element of a binary search tree

32. Given an array of strings, write a method to serialize that array into one single string, and a method to deserialize the single string back into the original array.

33. How to shuffle elements in an array?

34. translate string from "aabbbbc" to the format "a2b4c"

35. Given a string with repeated characters e.g. 'aaaalllriiiii', write a function to encode it repeating any sequence of duplicate characters with <number>x<character>, e.g. in that case '4xa3xlr4xi'. Only replace if it shortens the strring. Then questions about edge cases.

36. 3-sum problem that can be found on leetcode.

37. Given a bitmap, use a quaTree data structure to represent the bitmap. The maps are all squares with black or white pixels and the length of the map is 2^n (you can always divide the map into 4 smaller parts). Then give you a root node of a quaTree, calculate the total black pixel in this map, Follow up:Given two root node, generate the intersection of these two maps.

38. LeetCode Triangle: Given a triangle of integers, find the maximum path sum from the top point to the bottom: Follow up: Print out the path of the maximum path

39. Implement a queue using two stacks

40. There are 9 boxes labeled 1 to 9, some are open and some are closed. When you trow two dice, you have to close the boxes that sum up to the number on the dice; for example, if you get 6 and 1 on the two dice, you have to close boxes that add up to 7 (3 and 4, 2 and 5, 1 and 6) if they aren't already closed. Implement an algorithm that, given the status boxes and the value from the dice, returns all the possible combinations of boxes that can be closed to sum up to the number in the dice.

41. Given a binary tree, find if there are two subtrees that are the same. (i.e. the tree structures are the same; the values on all corresponding nodes are the same). You should find the largest subtrees. (And no, don't use brute force)

42. The first problem is about finding the shortest path in a graph with 2 follow-ups. The second one is about find 3 contiguous 1s in a horizontal or vertical line in a graph which only contains 0s and 1s.

43. Given a social network as a graph, return the closest path to a given node from a given node.

44. How do you split given string into words.

45. Implement a ArrayList

46. Perform additions of cells if index of row and column is given in a 2D array.

47. Version of find the shortest path in a directed graph

48. Question about getting the node that is closest in value to a tree.

49. Flip game, but with some difficult follow-ups.

50. Given a social network graph (nodes = people, edges = friendships between people) and a starting person, print the level of friendship for every other person with that person. That is, print the minimum number of "hops" (edges) to get from the start person to every other person.

51. Reverse a linked list in k chunk

52. how to trace back to the common ancestor in a binary tree for multiple nodes?

53. Island problem: island problem with little variation.

54. A log has start time and end time. Sort logs by start time.

55. Given an array of light bulbs, whose states can be either on or off, find a structure to represent them and a method to flip the light bulbs in a given range.

56. Write a function that takes in two arrays of integers that represent the digits of two numbers and return an array of digits that represents their sum.

57. Matrix - given a nxn matrix, print the matrix in diagonal from left to right.

58. Imagine an employee structure. How would you find the lowest common manager given two employees? Code the structures and functions required.

59. Code rand(min, max) with a uniform distribution

60. Given a sequence of intervals on the reals, write a program to calculate the total amount spanned by those intervals. Now do it in 2D.

61. cycle linked list, ambigram

62. Write a function that takes two trees as an argument and returns true if they are equal.

63. How would you mirror the nodes of every binary tree?

64. find the smallest node in BST that falls into a given range

65. find intersections of two arrays

66. Find the difference between two unsorted sets (lists). Interviewer eventually revealed that he wanted a solution in O(n) time.

67. Fibonacci, both recursively and iteratively.

68. Pascal triangle

69. How to reverse a string in c

70. Write a function to add a set {x, y} to a set of disjoint sets in a certain pattern.

71. Given a list of int&#039;s where each number exists twice, except one, find missing duplicate in the fastest possible time.

72. Given a string which only contains lower case you need to delete only the repeated letters only leave one the resulting string should lexicography as smallest., i.e. bcabc, delete the first b and first c

73. Implement a readers-writers lock using mutexes and condition variables.

74. You are given a set of unsorted strings to work with. Construct a program that will suggest autocorrect words as they are typed. (the unsorted strings are the valid words).

75. Given a string &#039;aaabb&#039;, can you rearrange the string such that no 2 similar letters are adjacent to each other.

76. Given an integer array shuffle the elements in the array such that no two elements are in same place

77. Return the max k numbers from an unsorted integer array. Each number in the array is in the range [0, 10000).

78. Return array with all values in a binary search tree that are between two values x and y.

79. Longest increasing sequence

80. Find the median of two sorted arrays

81. wrote a function to merge two linked lists.

82. Program Game of Life

83.Sparse matrices are usually stored by only storing the non-zero values. But, there is no single standard format for doing this. One such format is called Compressed Sparse Column (CSC).

Example: The following matrix is stored in CSC format using three arrays, vals, rows, and cols.

    /0 1 2 3 4 \

    | a 0 0 0 0 | 0

    | 0 c f 0 0 | 1

    | 0 0 0 0 h |…

| b d g 0 i | 3

    | 0 0 0 0 0 | 4

    | 0 e 0 0 0 | 5

     \ /

    vals = [a, b, c, d, e, f, g, h, i] ← double values

    rows = [0, 3, 1, 3, 5, 1, 3, 2, 3]

    cols = [0, 2, 5, 7, 7] ← position in the vals array (think of it as pointers into “vals”)

length of the cols array == the number of columns in the matrix

Generate this representation of the matrix from a sequence of triples (row, col, val).

Example: (1, 1, c), (3, 4, i), ...

84. Given a long string, and a width, parse the string return an array list containing string that shorter or equal to the given width; if multiple spaces left, split them equally

85. Given a sorted array [0-99]

With input: [1, 5, 45, 86]

Write a function that prints the empty regions, example Output: “0,2-4,6-44,46-85,87-99”

86. Given a string, print out a permutation of the string in which no two characters next to each other are the same.

87. Implement a class that can calculate the running average of a stream of input numbers up to a maximum of N numbers.

88. Implement string rotateString(string input, int amt)

89. Implement int strncmp(const char\* s1, const char\* s2, int n)

90. Implement a function that takes the set-wise subtraction of two sorted sets of integers. ie A = {1, 2, 3}, B = {3, 4, 5} =&gt; A - B = {1, 2}. There can be duplicates, in which case all duplicates should be removed should there be an occurrence in B. IE: {1, 2, 3, 3, 3} - {2, 3} = {1}.

91. Write a function if a given list is a subset of the library list. Talked about space and time complexity when the library list is too huge to fit in one list.. etc.

92. Write a function if a given string has a balanced parenthesis,bracket,curly bracket. Basically this exact question

93. The intent of this code is to reverse the words in a string

94. Create a BST from a sorted array.

95. given two binary trees, b1 and b2. Find the the intersection of b1 and b2 in linear time.

96. Given an NxN grid of 0s, 1s, and 2s, find out whether 1s or 2s is surrounded starting at (i,j). Being surrounded means that 1s is surrounded by 2s or that 2s is surrounded by 1s.

97. , let you to print out all the combination of 3 digit numbers with no duplicate, ex. 012, 013, ....123, 124, 125.

98. Calculate the combination of three digits number consisting of 0-9, and no duplicate is allowed.

99. wiggle sort

100. union find structure

101. Determine if two list are interleaving.

102. finding increasing by 1 sequence in 2D array

103. Implement a sliding window API

104. Implement a data structure to support dynamic insertion, deletion of intervals. Overlapping intervals should be merged.

105. given a string write a function to return the index of the first elememt which is non-alphabat ordered

106. merge two sorted lists. 2.merge k sorted lists, He asked followed up questions about memory allocation, difference between heap and priority queue, , time complexity and a few issues with my STL usage.

107. find k numbers which sum to n. ( I think the interviewer wanted to ask me to optimize the solution but we ran out of time)

108. find a path from source to target in a tree where each node can have arbitrary number of children.

## 109. (follow up: how to do this in sub O(n) time and linear space given that you can store the reachability in each node)

Strings:

1. Check if a given string is a palindrome or not.

2. Given a list of words and an abbreviation, I have to write a function which returns true or false about whether the abbreviation maps to exactly one word or not

3. Given a string S, you are allowed to convert it to a palindrome by adding characters in front of it. Find and return the shortest palindrome you can find by performing this transformation.

For example:

Given "aacecaaa", return "aaacecaaa".

Given "abcd", return "dcbabcd".

4. give you two strings S and T, find the shortest string in S which contains all the characters in T.

5. Given an array of strings, write a method to serialize that array into one single string, and a method to deserialize the single string back into the original array.

6. How do you split given string into words.

7. Given a string which only contains lower case you need to delete only the repeated letters only leave one the resulting string should lexicography as smallest., i.e. bcabc, delete the first b and first c

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11. Given a string, print out a permutation of the string in which no two characters next to each other are the same.

12.  Implement string rotateString(string input, int amt)

13. given a string write a function to return the index of the first elememt which is non-alphabat ordered

14. There are a set of dictionary words and a set of license plate numbers. Write a code/algorithm to find the shortest dictionary word which contains all the characters in the license plate, irrespective of the order of characters. Ex: RC101 is the license plate number. The shortest word that can be found in the dictionary is CAR which has characters 'R' and 'C' in the license plate.

15. Reverse a string. Reverse only characters in odd position in a string.

16. Given a string, find the longest substring and its length without repeating characters.

17. Given an array of strings, find the common prefix.

18. How would you detect whether a string is an anagram of a palindrome?

19. Given a list of Strings, how do you split it into lists of anagrams?

20. Break up a string into dictionary words: Given an input string and a dictionary of words, implement a method that breaks up the input string into a space-separated string of dictionary words that a search engine might use for "Did you mean?" For example, an input of "applepie" should yield an output of "apple pie", assuming that "apple" and "pie" are in the dictionary. Deal with the simplest cases only, where the input string can be divided only into two dictionary words.dict = ["apple", "pie"] "applepie" -&gt; "apple pie"

21. Give a string of words. Find anagram words and put them into the same list, then output the list of anagram words lists. input: [add, dad, care, race] output: [[add, dad], [care, race]]

22. Given a string pattern of 0s, 1s, and ?s (wildcards), generate all 0-1 strings that match this pattern. e.g. 1?00?101 -&gt; [10000101, 10001101, 11000101, 11001101]. You can generate the strings in any order that suits you.

23. Anagram Substring Search (Or Search for all permutations)

24. Find the longest substring with k unique characters in a given string

25. Check if edit distance between two strings is one