Dynamic Programming,

#1

Given two strings ****A**** and ****B****. Find the longest common ****sequence**** ( A sequence which does not need to be contiguous), which is common in both the strings.

You need to return the length of such longest common subsequence.

#2

Given a string ****A****, find the common ****palindromic sequence**** ( A sequence which does not need to be contiguous and is a pallindrome), which is common in itself.

You need to return the length of ****longest palindromic subsequence**** in ****A****.

#3

Given two strings ****A**** and ****B****, find the minimum number of steps required to convert ****A**** to ****B****. (each operation is counted as 1 step.)

You have the following 3 operations permitted on a word:

* Insert a character
* Delete a character
* Replace a character

#4

Given a string ****A****, find length of the longest repeating sub-sequence such that the two subsequence don’t have same string character at same position,

i.e., any i’th character in the two subsequences shouldn’t have the same index in the original string.

#5

Given two sequences ****A****, ****B****, count number of unique ways in sequence ****A****, to form a subsequence that is identical to the sequence ****B****.

#6

Given a string ****A****, we may represent it as a binary tree by partitioning it to two non-empty substrings recursively.

Below is one possible representation of ****A = “great”****:

great

/ \

gr eat

/ \ / \

g r e at

/ \

a t

To scramble the string, we may choose any non-leaf node and swap its two children.

For example, if we choose the node “gr” and swap its two children, it produces a scrambled string “rgeat”.

rgeat

/ \

rg eat

/ \ / \

r g e at

/ \

a t

We say that “rgeat” is a scrambled string of “great”.

Similarly, if we continue to swap the children of nodes “eat” and “at”, it produces a scrambled string “rgtae”.

rgtae

/ \

rg tae

/ \ / \

r g ta e

/ \

t a

We say that “rgtae” is a scrambled string of “great”.

Given two strings ****A**** and ****B**** of the same length, determine if ****B**** is a scrambled string of ****S****.

#7

Implement wildcard pattern matching with support for ‘?’ and ‘\*’ for strings ****A**** and ****B****.

* ’?’ : Matches any single character.
* ‘\*’ : Matches any sequence of characters (including the empty sequence).

The matching should cover the entire input string (not partial).

#8

Implement regular expression matching with support for '.' and '\*'.

'.' Matches any single character.  
'\*' Matches zero or more of the preceding element.

The matching should cover the entire input string (not partial).

The function prototype should be:

int isMatch(const char \*s, const char \*p)

#9

Given ****A****, ****B****, ****C****, find whether ****C**** is formed by the interleaving of ****A**** and ****B****.

****Input Format:****\*

The first argument of input contains a string, A.

The second argument of input contains a string, B.

The third argument of input contains a string, C.

#10

Given an 1D integer array ****A**** of length ****N****, find the length of longest subsequence which is first increasing then decreasing.

#11

GIven three prime numbers ****A, B**** and ****C**** and an integer ****D****.

You need to find the first(smallest) ****D**** integers which only have ****A, B, C**** or a combination of them as their prime factors.

#12

Given a binary grid ****A**** of size N x M consisting of 0's and 1's, find the ****area of the largest rectangle**** inside the grid such that all the cells inside the chosen rectangle should have 1 in them.

You are allowed to permutate the columns matrix i.e. you can arrange each of the column in any order in the final grid.

Please follow the sample input and explanation for more clarity.

#13

Given an integer ****A**** you have to find the ****number of ways**** to fill a 3 x A board with 2 x 1 dominoes.

Return the answer modulo ****109 + 7**** .

#14

There are a row of ****N**** houses, each house can be painted with one of the three colors: ****red, blue or green.****

The cost of painting each house with a certain color is different. You have to paint all the houses such that no two adjacent houses have the same color.

The cost of painting each house with a certain color is represented by a N x 3 cost matrix ****A****.

For example, ****A[0][0]**** is the cost of painting house 0 with color red; ****A[1][2]**** is the cost of painting house 1 with color green, and so on.

Find the ****minimum total cost**** to paint all houses.

#15

A message containing letters from A-Z is being encoded to numbers using the following mapping:

'A' -> 1

'B' -> 2

...

'Z' -> 26

Given an encoded message ****A**** containing digits, determine the total number of ways to decode it modulo ****109 + 7****.

#16

You are climbing a stair case and it takes ****A**** steps to reach to the top.

Each time you can either climb 1 or 2 steps. In how many distinct ways can you climb to the top?

#17

Find the ****longest increasing subsequence**** of a given array of integers, ****A****.

In other words, find a subsequence of array in which the subsequence’s elements are in strictly increasing order, and in which the subsequence is as long as possible.   
This subsequence is not necessarily contiguous, or unique.  
In this case, we only care about the ****length**** of the longest increasing subsequence.

#18

Given a number ****A****, return number of ways you can draw ****A**** chords in a circle with ****2 x A**** points such that no ****2**** chords intersect.

Two ways are different if there exists a chord which is present in one way and not in other.

Return the answer modulo ****109 + 7****.

#19

It’s Tushar’s birthday today and he has ****N**** friends.

Friends are numbered ****[0, 1, 2, ...., N-1]**** and ****ith**** friend have a positive strength ****B[i]****.

Today being his birthday, his friends have planned to give him birthday bombs (kicks).

Tushar's friends know Tushar's pain bearing limit and would hit accordingly.

If Tushar’s resistance is denoted by ****A (>=0)**** then find the lexicographically smallest order of friends to kick Tushar so that the cumulative kick strength (sum of the strengths of friends who kicks) doesn’t exceed his resistance capacity and total no. of kicks hit are maximum.

Also note that each friend can kick unlimited number of times (If a friend hits x times, his strength will be counted x times)

Return the lexicographically smallest array of maximum length where the ith index represents the index of the friend who will hit.

#20

Given an array of non-negative integers, ****A****, you are initially positioned at the 0th index of the array.

Each element in the array represents your maximum jump length at that position.

Determine if you are able to reach the last index.

#21

Given an array of non-negative integers, ****A****, of length ****N****, you are initially positioned at the first index of the array.

Each element in the array represents your maximum jump length at that position.

Return the ****minimum**** number of jumps required to reach the last index.

If it is not possible to reach the last index, return -1.

#22

Find ****longest**** Arithmetic Progression in an integer array ****A**** of size ****N****, and return its length.

More formally, find longest sequence of indices, ****0 < i1 < i2 < … < ik < ArraySize(0-indexed)**** such that sequence ****A[i1], A[i2], …, A[ik]**** is an Arithmetic Progression.

Arithmetic Progression is a sequence in which all the differences between consecutive pairs are the same, i.e sequence ****B[0], B[1], B[2], …, B[m - 1]**** of length ****m**** is an Arithmetic Progression if and only if ****B[1] - B[0] == B[2] - B[1] == B[3] - B[2] == … == B[m - 1] - B[m - 2]****

#23

Find out the number of N digit numbers, whose digits on being added equals to a given number S. Note that a valid number starts from digits 1-9 except the number 0 itself. i.e. leading zeroes are not allowed.

Since the answer can be large, output answer modulo 1000000007

#24

Given a set of strings, ****A**** of length ****N****.

Return the length of smallest string which has all the strings in the set as substring.

#25

Given a ****3 x A**** board, find the number of ways to color it using at most ****4**** colors such that no ****2**** adjacent boxes have same color.

Diagonal neighbors are not treated as adjacent boxes.

Return the ways modulo ****109 + 7**** as the answer grows quickly.

#26

Given a matrix M of size nxm and an integer K, find the maximum element in the K manhattan distance neighbourhood for all elements in nxm matrix.   
In other words, for every element M[i][j] find the maximum element M[p][q] such that abs(i-p)+abs(j-q) <= K.

Note: Expected time complexity is O(N\*N\*K)

#27

Given an array of integers ****A**** of size ****N**** in which ith element is the price of the stock on day ****i****.

You can complete atmost ****B**** transactions.

Find the ****maximum profit**** you can achieve.

#28

There are ****A**** coins (Assume A is even) in a line.

Two players take turns to take a coin from one of the ends of the line until there are no more coins left.

The player with the larger amount of money wins, Assume that you go first.

Return the ****maximum amount**** of money you can win.

#29

Given an expression, ****A****, with operands and operators ****(OR , AND , XOR)****, in how many ways can you evaluate the expression to true, by grouping in different ways?

Operands are only ****true**** and ****false****.

Return the number of ways to evaluate the expression modulo ****103 + 3****.

#30

You are given ****A**** eggs, and you have access to a building with ****B**** floors from ****1**** to ****B****.

Each egg is identical in function, and if an egg breaks, you cannot drop it again.

You know that there exists a floor ****C**** with ****0 <= C <= B**** such that any egg dropped at a floor higher than ****C**** will break, and any egg dropped at or below floor ****C**** will not break.

Each move, you may take an egg (if you have an unbroken one) and drop it from any floor ****X**** (with ****1 <= X <= B****).

Your goal is to know with certainty what the value of ****C**** is.

What is the minimum number of moves that you need to know with certainty what ****C**** is, regardless of the initial value of ****C****

#31

Say you have an array, ****A****, for which the ****ith**** element is the price of a given stock on day ****i****.

Design an algorithm to find the ****maximum**** profit. You may complete at most ****2**** transactions.

Return the maximum possible profit.

#32

Given a string ****A**** containing just the characters ****’(‘**** and ****’)’****.

Find the length of the ****longest**** valid (well-formed) parentheses substring.

#33

Given a tree with ****N**** nodes numbered from ****1**** to ****N****.

Each edge is bi-directional and has a certain weight assigned to it.

You are given ****Q**** queries, in each query you are given two integers ****u**** and ****v**** and you are required to find the ****maximum weighted edge**** in a simple path from ****u**** to ****v****.

You have to return the weight of the edge for each queries.

#34

Given a binary tree ****T****, find the maximum path sum.

The path may start and end at any node in the tree.

#35

Two kingdoms are on a war right now, kingdom X and kingdom Y. As a war specialist of kingdom X, you scouted kingdom Y area.

A kingdom area is defined as a ****N x M grid**** with each cell denoting a village.  
Each cell has a value which denotes the strength of each corresponding village.  
The strength can also be ****negative****, representing those warriors of your kingdom who were held hostages.

There’s also another thing to be noticed.

* The strength of any village on row larger than one (2<=r<=N) is stronger or equal to the strength of village which is exactly above it.
* The strength of any village on column larger than one (2<=c<=M) is stronger or equal to the strength of vilage which is exactly to its left.  
  (stronger means having higher value as defined above).

So your task is, find the ****largest sum of strength**** that you can erase by bombing ****one sub-matrix**** in the grid.

#36

Given a 2D integer array ****A**** of size N \* N representing a triangle of numbers.

Find the maximum path sum from top to bottom. Each step you may move to adjacent numbers on the row below.

#37

Given a 2D binary matrix ****A**** of size N x M find the area of ****maximum size square sub-matrix**** with all ****1's****.

#38

Given a 2D integer matrix ****A**** of size N x M.

From ****A[i][j]**** you can move to ****A[i+1][j]****, if ****A[i+1][j]**** > ****A[i][j]****, or can move to ****A[i][j+1]**** if ****A[i][j+1]**** > ****A[i][j]****.

The task is to find and output the longest path length if we start from ****(0, 0)****.

#39

Given an integer array ****A**** containing ****N**** integers.

You need to divide the array ****A**** into two subsets S1 and S2 such that the absolute difference between their sums is minimum.

Find and return this ****minimum possible absolute difference****.

#40

Given an integer array ****A**** of size ****N****.

You are also given an integer ****B****, you need to find whether their exist a subset in ****A**** whose sum equal ****B****.

If there exist a subset then return ****1**** else return ****0****.

#41

Given a grid of size m \* n, lets assume you are starting at (1,1) and your goal is to reach (m,n). At any instance, if you are on (x,y), you can either go to (x, y + 1) or (x + 1, y).

Now consider if some obstacles are added to the grids. How many unique paths would there be?  
An obstacle and empty space is marked as 1 and 0 respectively in the grid.

#42

The demons had captured the princess ****(P)**** and imprisoned her in the bottom-right corner of a dungeon. The dungeon consists of M x N rooms laid out in a 2D grid. Our valiant knight ****(K)**** was initially positioned in the top-left room and must fight his way through the dungeon to rescue the princess.

The knight has an initial health point represented by a positive integer. If at any point his health point drops to 0 or below, he dies immediately.

Some of the rooms are guarded by demons, so the knight loses health (negative integers) upon entering these rooms; other rooms are either empty (0’s) or contain magic orbs that increase the knight’s health (positive integers).

In order to reach the princess as quickly as possible, the knight decides to move only rightward or downward in each step.

****Write a function to determine the knight’s minimum initial health so that he is able to rescue the princess.****

For example, given the dungeon below, the initial health of the knight must be at least 7 if he follows the optimal path

RIGHT-> RIGHT -> DOWN -> DOWN.



#43

Given a 2D integer array ****A**** of size M x N, you need to find a path from top left to bottom right which minimizes the sum of all numbers along its path.

#44

Given a triangle, find the minimum path sum from top to bottom. Each step you may move to adjacent numbers on the row below.

For example, given the following triangle

[

[2],

[3,4],

[6,5,7],

[4,1,8,3]

]

The minimum path sum from top to bottom is 11 (i.e., 2 + 3 + 5 + 1 = 11).

#45

Given a 2D binary matrix filled with 0’s and 1’s, find the largest rectangle containing ****all ones**** and return its area.

Bonus if you can solve it in O(n^2) or less.

#46

There is a rod of length N lying on x-axis with its left end at x = 0 and right end at x = N. Now, there are M weak points on this rod denoted by positive integer values(all less than N) A1, A2, …, AM. You have to cut rod at all these weak points. You can perform these cuts in any order. After a cut, rod gets divided into two smaller sub-rods. Cost of making a cut is the length of the sub-rod in which you are making a cut.

Your aim is to minimise this cost. Return an array denoting the sequence in which you will make cuts. If two different sequences of cuts give same cost, return the lexicographically smallest.

#47

On a ****N \* M**** chessboard, where rows are numbered from 1 to N and columns from 1 to M, there are queens at some cells. Return a ****N \* M**** array A, where A[i][j] is number of queens that can attack cell (i, j). While calculating answer for cell (i, j), assume there is no queen at that cell.

#48

Given a 2D matrix, find the number non-empty sub matrices, such that the sum of the elements inside the sub matrix is equal to 0. (note: elements might be negative).

#49

You are given a set of coins ****S****. In how many ways can you make sum ****N**** assuming you have infinite amount of each coin in the set.

#50

Find the contiguous subarray within an array (containing at least one number) which has the largest product.  
Return an integer corresponding to the maximum product possible.

#51

Say you have an array, ****A****, for which the ****i****th element is the price of a given stock on day ****i****.

If you were only permitted to complete at most one transaction (i.e, buy one and sell one share of the stock), design an algorithm to find the maximum profit.

Return the ****maximum**** possible profit.

#52

You are given a sequence of black and white horses, and a set of K stables numbered 1 to K. You have to accommodate the horses into the stables in such a way that the following ****conditions are satisfied:****

* You fill the horses into the stables preserving the relative order of horses. For instance, you cannot put horse 1 into stable 2 and horse 2 into stable 1. You have to preserve the ordering of the horses.
* No stable should be empty and no horse should be left unaccommodated.
* Take the product (number of white horses \* number of black horses) for each stable and take the sum of all these products. This value should be the minimum among all possible accommodation arrangements

#53

Given a N \* 2 array ****A**** where ****(A[i][0], A[i][1])**** represents the ****ith**** pair.

In every pair, the first number is always smaller than the second number.

A pair (c, d) can follow another pair (a, b) if b < c , similarly in this way a chain of pairs can be formed.

Find the ****length of the longest chain subsequence**** which can be formed from a given set of pairs.

#54

Given a ****2 x N**** grid of integer, ****A****, choose numbers such that the sum of the numbers  
is maximum and ****no**** two chosen numbers are adjacent horizontally, vertically or diagonally, and return it.

#55

Given an integer array ****A**** of size ****N****. You have to merge all the elements of the array into one with the ****minimum possible cost****.

The rule for merging is as follows:

· Choose any two adjacent elements of the array with values say ****X**** and ****Y**** and merge them into a single element with value ****(X + Y)**** paying a total cost of ****(X + Y)****.

Return the minimum possible cost of merging all elements.

#56

Given an array of positive elements, you have to flip the sign of some of its elements such that the resultant sum of the elements of array should be minimum non-negative(as close to zero as possible). Return the minimum no. of elements whose sign needs to be flipped such that the resultant sum is minimum non-negative.

****Constraints:****

1 <= n <= 100

Sum of all the elements will not exceed 10,000.

#57

As it is Tushar’s Birthday on March 1st, he decided to throw a party to all his friends at TGI Fridays in Pune.  
Given are the eating capacity of each friend, filling capacity of each dish and cost of each dish. A friend is satisfied if the sum of the filling capacity of dishes he ate is equal to his capacity. Find the minimum cost such that all of Tushar’s friends are satisfied (reached their eating capacity).

#58

Given two integer arrays ****A**** and ****B**** of size ****N**** each which represent ****values**** and ****weights**** associated with ****N**** items respectively.

Also given an integer ****C**** which represents knapsack capacity.

Find out the maximum value subset of ****A**** such that sum of the weights of this subset is smaller than or equal to ****C****.

#59

Given an array ****A**** with non negative numbers, divide the array into two parts such that the average of both the parts is equal.

Return both parts (If exist). If there is no solution. return an empty list.

#60

Say you have an array, ****A****, for which the ****ith**** element is the price of a given stock on day ****i****.

Design an algorithm to find the maximum profit.

You may complete as many transactions as you like (i.e., buy one and sell one share of the stock multiple times).

However, you may not engage in multiple transactions at the same time (ie, you must sell the stock before you buy again).

#61

Given a string ****A**** and a dictionary of words ****B****, add spaces in ****A**** to construct a sentence where each word is a valid dictionary word.

Return all such possible sentences.

#62

Given an integer ****A****, how many structurally unique BST’s (binary search trees) exist that can store values ****1…A****?

#63

You are given two positive integers A and B. For all permutations of [1, 2, …, A], we create a BST. Count how many of these have height B.

Notes:

1. Values of a permutation are sequentially inserted into the BST by general rules i.e in increasing order of indices.
2. Height of BST is maximum number of edges between root and a leaf.
3. Return answer modulo 109 + 7.
4. Expected time complexity is worst case O(N4).
5. 1 ≤ N ≤ 50

#64

Given a string ****A****, partition ****A**** such that every substring of the partition is a palindrome.

Return the ****minimum**** cuts needed for a palindrome partitioning of ****A****.

#65

Given a string ****A**** and a dictionary of words ****B****, determine if ****A**** can be segmented into a space-separated sequence of one or more dictionary words.

Greedy Algorithm

#1

Given an array ****A****, of ****N**** integers A.

Return the highest product possible by multiplying 3 numbers from the array.

#2

****N**** light bulbs are connected by a wire.

Each bulb has a switch associated with it, however due to faulty wiring, a switch also changes the state of all the bulbs to the right of current bulb.

Given an initial state of all bulbs, find the minimum number of switches you have to press to turn on all the bulbs.

You can press the same switch multiple times.

#3

****N**** light bulbs are connected by a wire.

Each bulb has a switch associated with it, however due to faulty wiring, a switch also changes the state of all the bulbs to the right of current bulb.

Given an initial state of all bulbs, find the minimum number of switches you have to press to turn on all the bulbs.

You can press the same switch multiple times.

#4

Given an integer array ****A**** of size ****N**** consisting of unique integers from 1 to N. You can swap any two integers atmost ****B**** times.

Return the largest lexicographical value array that can be created by executing atmost B swaps.

#5

Given an 2D integer array ****A**** of size N x 2 denoting time intervals of different meetings.

Where:

· ****A[i][0]**** = start time of the ith meeting.

· ****A[i][1]**** = end time of the ith meeting.

Find the ****minimum number of conference rooms**** required so that all meetings can be done.

#6

There are ****N**** children standing in a line. Each child is assigned a rating value.

You are giving candies to these children subjected to the following requirements:

1. Each child must have at least one candy.

2. Children with a higher rating get more candies than their neighbors.

#7

There is a row of seats. Assume that it contains N seats adjacent to each other. There is a group of people who are already seated in that row randomly. i.e. some are sitting together & some are scattered.

An occupied seat is marked with a character 'x' and an unoccupied seat is marked with a dot ('.')

Now your target is to make the whole group sit together i.e. next to each other, without having any vacant seat between them in such a way that the total number of hops or jumps to move them should be minimum.

****Return minimum** value % MOD **where** MOD = 10000003**

#8

There are ****N**** Mice and ****N**** holes that are placed in a straight line. Each hole can accomodate only 1 mouse.

The positions of Mice are denoted by array ****A**** and the position of holes are denoted by array ****B****.

A mouse can stay at his position, move one step right from x to x + 1, or move one step left from x to x − 1. Any of these moves consumes 1 minute.

Assign mice to holes so that the time when the last mouse gets inside a hole is ****minimized****.

#9

Given an array of size ****n****, find the majority element. The majority element is the element that appears more than ****floor(n/2)**** times.

You may assume that the array is non-empty and the majority element always exist in the array.

#10

Given two integer arrays ****A**** and ****B**** of size ****N****.  
There are ****N**** gas stations along a circular route, where the amount of gas at station ****i**** is ****A[i]****.

You have a car with an unlimited gas tank and it costs ****B[i]**** of gas to travel from station ****i****   
to its next station ****(i+1)****. You begin the journey with an empty tank at one of the gas stations.

Return the minimum starting gas station’s index if you can travel around the circuit once, otherwise return -1.

You can only travel in one direction. ****i to i+1, i+2, … n-1, 0, 1, 2..**** Completing the circuit means starting at ****i**** and   
ending up at ****i**** again.

Graph Data Structure & Algorithms

#1

Given an directed graph having ****A**** nodes labelled from ****1**** to ****A**** containing ****M**** edges given by matrix ****B**** of size M x 2such that there is a edge directed from node

****B[i][0]**** to node ****B[i][1]****.

Find whether a path exists from node ****1**** to node ****A****.

Return ****1**** if path exists else return ****0****.

#2

Given an ****N x M**** matrix ****A**** of non-negative integers representing the ****height**** of each unit cell in a continent, the "Blue lake" touches the left and top edges of the matrix and the "Red lake" touches the right and bottom edges.

Water can only flow in four directions (up, down, left, or right) from a cell to another one with ****height equal or lower****.

Find the number of cells from where water can flow to both the Blue and Red lake.

#3

Given ****A**** and ****B**** you have to find all stepping numbers in range ****A**** to ****B****.

****The stepping number:****

A number is called as a stepping number if the adjacent digits have a difference of 1.

e.g. 123 is stepping number, but 358 is not a stepping number

#4

Given a 2D character matrix ****A**** of size N x M, containing 'X' and 'O', capture all regions surrounded by 'X'.

A region is captured by flipping all 'O's into 'X's in that surrounded region.

#5

Given a 2D board and a word, find if the word exists in the grid.

The word can be constructed from letters of sequentially adjacent cell, where "adjacent" cells are those horizontally or vertically neighboring. The cell itself does not count as an adjacent cell.   
The same letter cell may be used more than once.

#6

Given a tree with ****N**** nodes labelled from ****1**** to ****N****.

Each node is either ****good**** or ****bad**** denoted by binary array ****A**** of size ****N**** where if ****A[i]**** is ****1**** then ****ithnode**** is ****good**** else if ****A[i]**** is ****0**** then ****ith**** node is ****bad****.

Also the given tree is rooted at node ****1**** and you need to tell the number of ****root to leaf**** paths in the tree that contain not more than ****C**** good nodes.

#7

Given an arbitrary unweighted rooted tree which consists of ****N**** nodes.

The goal of the problem is to find ****largest distance between two nodes in a tree.****

Distance between two nodes is a number of edges on a path between the nodes (there will be a unique path between any pair of nodes since it is a tree).

The nodes will be numbered ****0**** through ****N - 1****.

The tree is given as an array ****A****, there is an edge between nodes ****A[i]**** and ****i (0 <= i < N)****. Exactly one of the i's will have A[i] equal to -1, it will be root node.

#8

Given an directed graph having ****A**** nodes. A matrix ****B**** of size M x 2 is given which represents the ****M**** edges such that there is a edge directed from node ****B[i][0]**** to node ****B[i][1]****.

Find whether the graph contains a cycle or not, return ****1**** if cycle is present else return ****0****.

#9

Given a undirected tree with ****N**** nodes labeled from ****1**** to ****N****.

Each node has a certain weight assigned to it given by an integer array ****A**** of size ****N****.

You need to delete an edge in such a way that ****Product**** between sum of weight of nodes in one subtree with sum of weight of nodes in other subtree is ****maximized****.

Return this maximum possible product modulo ****109 + 7****.

#10

There are ****A**** people numbered 1 to A in a football academy.  
The coach of the academy wants to make two teams (not necessary of equal size) but unfortunately, not all people get along, and several refuse to be put on the same team as that of their enemies.

Given a 2-D array ****B**** of size M x 2 denoting the enemies i.e B[i][0] and B[i][1] both are enemies of each other.

Return ****1**** if it possible to make exactly two teams else return ****0****.

#11

There is a rectangle with left bottom as (0, 0) and right up as (x, y). There are N circles such that their centers are inside the rectangle.  
Radius of each circle is R. Now we need to find out if it is possible that we can move from (0, 0) to (x, y) without touching any circle.

#12

Rishabh takes out his **[Snakes and Ladders Game](https://en.wikipedia.org/wiki/Snakes_and_Ladders)**, stares the board and wonders: "If I can always roll the die to whatever number I want, what would be the ****least number of rolls to reach the destination****?"

****RULES:****

* The game is played with cubic dice of ****6**** faces numbered from ****1**** to ****A****.
* Starting from ****1**** , land on square ****100**** with the exact roll of the die. If moving the number rolled would place the player beyond square ****100****, no move is made.
* If a player lands at the base of a ladder, the player must climb the ladder. Ladders go up only.
* If a player lands at the mouth of a snake, the player must go down the snake and come out through the tail. Snakes go down only.

****BOARD DESCRIPTION:****

* The board is always 10 x 10 with squares numbered from ****1**** to ****100****.
* The board contains ****N**** ladders given in a form of 2D matrix ****A**** of size N \* 2 where ****(A[i][0], A[i][1])**** denotes a ladder that has its base on square ****A[i][0]**** and end at square ****A[i][1]****.
* The board contains ****M**** snakes given in a form of 2D matrix ****B**** of size M \* 2 where ****(B[i][0], B[i][1])**** denotes a snake that has its mouth on square ****B[i][0]**** and tail at square ****B[i][1]****.

#13

Given a binary matrix ****A**** of size N x M.

Cells which contain ****1**** are called ****filled cell**** and cell that contain ****0**** are called ****empty cell****.

Two cells are said to be connected if they are adjacent to each other horizontally, vertically, or diagonally.

If one or more ****filled cells**** are also connected, they form a ****region****. Find the ****length of the largest region****.

#14

Given a binary tree, return the level order traversal of its nodes' values. (ie, from left to right, level by level).

#15

You are given an integer N. You have to find smallest multiple of N which consists of digits 0 and 1 only. Since this multiple could be large, return it in form of a string.

#16

You are given a ****A**B** character matrix named ****C****. Every cell in ****C**** has a character ****U,R,L or D**** indicating up,right,left and down.

Your target is to go from ****top left corner**** to the ****bottom right corner**** of the matrix.

But there are some restrictions while moving along the matrix:

* If you follow what is written in the cell then you can move freely.
* But if you don't follow what is written in the cell then you have to pay 1 unit of cost.

Like: If a cell contains character ****U**** and you go ****right**** instead of ****Up**** you have to pay 1 unit of cost.

So your task is to find the ****minimum cost**** to go from top-left corner to the bottom-right corner.

#17

Rishabh wants to get a permutation ****B****.

Also, Rishabh has some ****M**** good pairs given in a form of 2D matrix ****C**** of size M x 2 where ****(C[i][0], C[i][1])**** denotes that two indexes of the permutation ****A****.

In one operation he can swap ****Ax**** and ****Ay**** only if ****(x, y)**** is a good pair.

You have to tell whether Rishabh can obtain permutation ****B**** by performing the above operation any number of times on permutation ****A****.

If the permutation ****B**** can be obtained return ****1**** else return ****0****.

#18

There are ****A**** islands and there are ****M**** bridges connecting them. Each bridge has some ****cost**** attached to it.

We need to find bridges with ****minimal cost**** such that all islands are connected.

It is guaranteed that input data will contain ****at least one**** possible scenario in which all islands are connected with each other.

#19

There are a total of ****A**** courses you have to take, labeled from ****1**** to ****A****.

Some courses may have prerequisites, for example to take course ****2**** you have to first take course ****1****, which is expressed as a pair: ****[1,2]****.

Given the total number of courses and a list of prerequisite pairs, is it possible for you to finish all courses?

Return ****1**** if it is ****possible**** to finish all the courses, or ****0**** if it is ****not possible**** to finish all the courses.

#20

Given an undirected graph having ****A**** nodes labelled from ****1**** to ****A**** with ****M**** edges given in a form of matrix ****B**** of size M x 2 where (B[i][0], B[i][1]) represents two nodes B[i][0] and B[i][1] connected by an edge.

Find whether the graph contains a cycle or not, return ****1**** if cycle is present else return ****0****.

#21

Given ****N x M**** character matrix ****A**** of O's and X's, where O = white, X = black.  
  
Return the number of black shapes. A black shape consists of one or more adjacent X's (diagonals not included)

#22

Given a singly linked list where elements are sorted in ascending order, convert it to a height balanced BST.

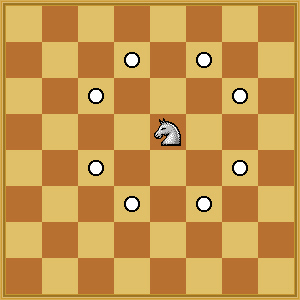
****A height balanced BST :**** a height-balanced binary tree is defined as a binary tree in which the depth of the two subtrees of every node never differ by more than 1.

#23

How many minimum numbers from fibonacci series are required such that sum of numbers should be equal to a given Number N?

#24

Given any source point, ****(C, D)**** and destination point, ****(E, F)**** on a chess board, we need to find whether Knight can move to the destination or not.



The above figure details the movements for a knight ( ****8**** possibilities ).

If yes, then what would be the ****minimum**** number of steps for the knight to move to the said point.  
If knight can not move from the source point to the destination point, then return ****-1****.

#25

Given a graph of ****A**** nodes. Also given the weighted edges in the form of array ****B****.

You are also given starting point ****C**** and destination point ****D****.

Also given are some extra edges in the form of vector ****E****.

You need to find the length of the shortest path from C to D if you can use maximum one road from the given roads in E.

All roads are one way ie they go from B[i][0] to B[i][1].

#26

Given two words ****A**** and ****B****, and a dictionary, ****C****, find the length of ****shortest**** transformation sequence from ****A**** to ****B****, such that:

* You must change exactly ****one**** character in every transformation.
* Each intermediate word must exist in the dictionary.

#27

Given two words (****start**** and ****end****), and a dictionary, find the shortest transformation sequence from ****start**** to ****end****, such that:

* Only one letter can be changed at a time
* Each intermediate word must exist in the dictionary

If there are multiple such sequence of shortest length, return all of them. Refer to the example for more details.

#28

Clone an undirected graph. Each node in the graph contains a label and a list of its neighbors.