1] Implement an algorithm to determine if a string has all unique characters. What if you cannot use additional data structures?

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2]Given two strings, write a method to decide if one is a permutation of the other.

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3]Write a method to replace all spaces in a string with '%20'. You may assume that the string has sufficient space at the end to hold the additional characters, and that you are given the "true" length of the string. (Note: If implementing in Java, please use a character array so that you can perform this operation in place.)

Input: "Mr John Smith ", 13

Output: "Mr%20John%20Smith"

****

4] Given a string, write a function to check if it is a permutation of a palindrome. A palindrome is a word or phrase that is the same forwards and backwards. A permutation is a rearrangement of letters. The palindrome does not need to be limited to just dictionary words.

Input: Tact Coa

Output: True (permutations: "taco cat", "atco eta", etc.)

****

5]: Implement a method to perform basic string compression using the counts of repeated characters. For example, the string aabcccccaaa would become a2blc5a3. If the "compressed" string would not become smaller than the original string, your method should return the original string. You can assume the string has only uppercase and lowercase letters (a - z).

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6] Given an image represented by an NxN matrix, where each pixel in the image is 4 bytes, write a method to rotate the image by 90 degrees. Can you do this in place?

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7]Assumeyou have a method isSubstringwhich checks if oneword is a substring of another. Given two strings, sl and s2, write code to check if s2 is a rotation of sl using only one call to isSubstring **(e.g., "waterbottle" is a rotation of"erbottlewat").**

****

8]Write code to partition a linked list around a value x, such that all nodes less than x come before all nodes greater than or equal to x. If x is contained within the list, the values of x only need to be after the elements less than x (see below). The partition element x can appear anywhere in the "right partition"; it does not need to appear between the left and right partitions.

Input: 3 -> 5 -> 8 -> 5 -> 10 -> 2 -> 1[partition= 5]

Output: 3 -> 1 -> 2 -> 10 -> 5 -> 5 -> 8

****

9] You have two numbers represented by a linked list, where each node contains a single digit. The digits are stored in reverse order, such that the 1 's digit is at the head of the list. Write a function that adds the two numbers and returns the sum as a linked list.

Input: (7-> 1 -> 6) + (5 -> 9 -> 2).That is,617 + 295.

Output: 2 -> 1 -> 9. That is, 912.

FOLLOW UP

Suppose the digits are stored in forward order. Repeat the above problem.

EXAMPLE

lnput:(6 -> 1 -> 7) + (2 -> 9 -> 5).That is,617 + 295.

Output: 9 -> 1 -> 2. That is, 912.

****

10]Given a circular linked list, implement an algorithm that returns the node at the beginning of the loop.

DEFINITION

Circular linked list: A (corrupt) linked list in which a node's next pointer points to an earlier node, so as to make a loop in the linked list.

Input: A -> B -> C -> D -> E -> C [the same C as earlier]

Output: C

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11]An animal shelter, which holds only dogs and cats, operates on a strictly"first in, first out" basis. People must adopt either the "oldest" (based on arrival time) of all animals at the shelter, or they can select whether they would prefer a dog or a cat (and will receive the oldest animal of that type). They cannot select which specific animal they would like. Create the data structures to maintain this system and implement operations such as enqueue, dequeueAny, dequeueDog, and dequeueCat. You may use the built-in Linked list data structure.

****

12]You are given a list of projects and a list of dependencies (which is a list of pairs of projects, where the second project is dependent on the first project). All of a project's dependencies must be built before the project is. Find a build order that will allow the projects to be built. If there is no valid build order, return an error.

Input:

projects: a, b, c, d, e, f

dependencies: (a, d), (f, b), (b, d), (f, a), (d, c)

Output: f, e, a, b, d, c

****

13] You are given two 32-bit numbers, N and M, and two bit positions, i and j. Write a method to insert M into N such that M starts at bit j and ends at bit i. You can assume that the bits j through i have enough space to fit all of M. That is, if M = 10011, you can assume that there are at least 5 bits between j and i. You would not, for example, have j = 3 and i = 2, because M could not fully fit between bit 3 and bit 2.

Input: N =10000000000, M = 10011, i= 2, j= 6

Output: N = 10001001100

****

14] Given a real number between O and 1 (e.g., 0.72) that is passed in as a double, print the binary representation. If the number cannot be represented accurately in binary with at most 32 characters, print "ERROR:'

****

15]You have an integer and you can flip exactly one bit from a 0 to a 1. Write code to find the length of the longest sequence of ls you could create.

Input: 1775 (or: 11011101111)

Output: 8

****

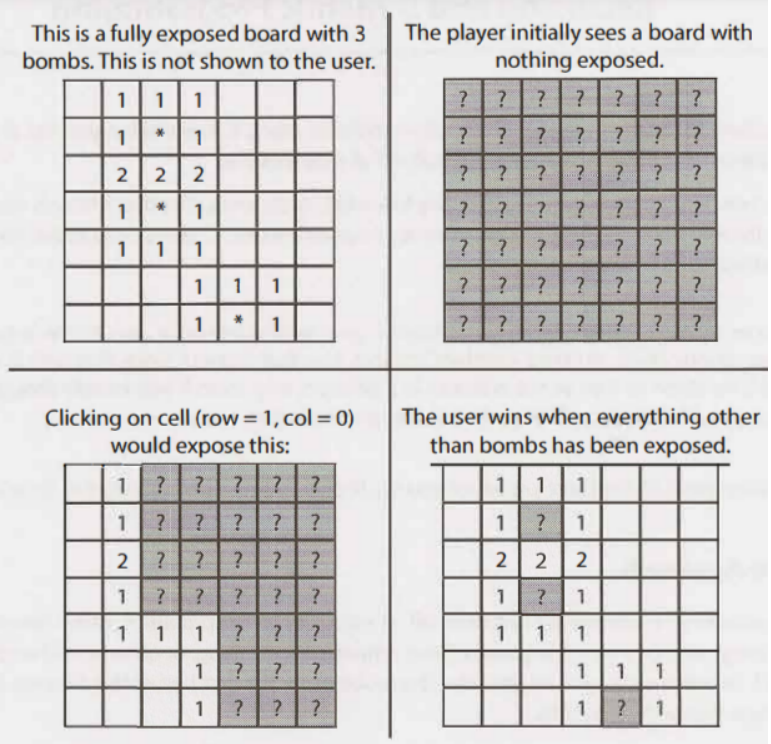
16]Write a function to determine the number of bits you would need to flip to convert integer A to integer B.

Input: 29 (or: 11101), 15 (or: 01111)

Output: 2

****

17] Design and implement a text-based Minesweeper game. Minesweeper is the classic single-player computer game where an NxN grid has B mines (or bombs) hidden across the grid. The remaining cells are either blank or have a number behind them. The numbers reflect the number of bombs in the surrounding eight cells. The user then uncovers a cell. If it is a bomb, the player loses. If it is a number, the number is exposed. If it is a blank cell, this cell and all adjacent blank cells (up to and including the surrounding numeric cells) are exposed. The player wins when all non-bomb cells are exposed. The player can also flag certain places as potential bombs. This doesn't affect game play, other than to block the user from accidentally clicking a cell that is thought to have a bomb. (Tip for the reader: if you're not familiar with this game, please play a few rounds on line first.)


This is a fully exposed board with 3 bombs. This is not shown to the user.
The player initially sees a board with nothing exposed.
Clicking on cell (row = 1, col = 0) would expose this:
The user wins when everything other than bombs has been exposed.

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