number link-href text¿
1. Two Sum https://leetcode.com/problems/two-sum "Given an array of integers, ret
urn indices of the two numbers such that they add up to a specific target.

You may assume that each input would have exactly one solution, and you may not use
the same element twice.

Example:

Given nums = [2, 7, 11, 15], target = 9,

Because nums[0] + nums[1] = 2 + 7 = 9,
return [0, 1]."¿
2. Add Two Numbers https://leetcode.com/problems/add-two-numbers "You are given t
wo non-empty linked lists representing two non-negative integers. The digits are sto
red in reverse order and each of their nodes contain a single digit. Add the two num
bers and return it as a linked list.

You may assume the two numbers do not contain any leading zero, except the number 0
itself.

Example
Input: (2 -> 4 -> 3) + (5 -> 6 -> 4)
Output: 7 -> 0 -> 8
Explanation: 342 + 465 = 807."¿
3. Longest Substring Without Repeating Characters https://leetcode.com/problems/lo
ngest-substring-without-repeating-characters "Given a string, find the length of
the longest substring without repeating characters.

Examples:

Given ""abcabcbb"", the answer is ""abc"", which the length is 3.

Given ""bbbbb"", the answer is ""b"", with the length of 1.

Given ""pwwkew"", the answer is ""wke"", with the length of 3. Note that the answer
must be a substring, ""pwke"" is a subsequence and not a substring."¿
4. Median of Two Sorted Arrays https://leetcode.com/problems/median-of-two-sorted-a
rrays "There are two sorted arrays nums1 and nums2 of size m and n respectively.

Find the median of the two sorted arrays. The overall run time complexity should be
O(log (m+n)).

Example 1:

nums1 = [1, 3]
nums2 = [2]

The median is 2.0

Example 2:

nums1 = [1, 2]
nums2 = [3, 4]

The median is (2 + 3)/2 = 2.5"¿
5. Longest Palindromic Substring https://leetcode.com/problems/longest-palindromi
c-substring "Given a string s, find the longest palindromic substring in s. You may
assume that the maximum length of s is 1000.

Example 1:

Input: ""babad""
Output: ""bab""
Note: ""aba"" is also a valid answer.

Example 2:

Input: ""cbbd""

Output: ""bb"""¿
6. ZigZag Conversion https://leetcode.com/problems/zigzag-conversion "The string ""PAYPALISHIRING"" is written in a zigzag pattern on a given number of rows like this: (you may want to display this pattern in a fixed font for better legibility)

```
P   A   H   N
A P L S I I G
Y   I   R
```

And then read line by line: ""PAHNAPLSIIGYIR""

Write the code that will take a string and make this conversion given a number of rows:

```
string convert(string s, int numRows);
```

Example 1:

Input: s = ""PAYPALISHIRING"", numRows = 3
Output: ""PAHNAPLSIIGYIR""

Example 2:

Input: s = ""PAYPALISHIRING"", numRows = 4
Output: ""PINALSIGYAHRPI""
Explanation:

```
P     I    N
A   L S  I G
Y A   H R
P     I"¿
```

7. Reverse Integer https://leetcode.com/problems/reverse-integer "Given a 32-bit signed integer, reverse digits of an integer.

Example 1:

Input: 123
Output: 321

Example 2:

Input: -123
Output: -321

Example 3:

Input: 120
Output: 21

Note:

Assume we are dealing with an environment which could only store integers within the 32-bit signed integer range: [¿231, 231 ¿ 1]. For the purpose of this problem, assume that your function returns 0 when the reversed integer overflows."¿
8. String to Integer (atoi) https://leetcode.com/problems/string-to-integer-atoi "Implement atoi which converts a string to an integer.

The function first discards as many whitespace characters as necessary until the first non-whitespace character is found. Then, starting from this character, takes an optional initial plus or minus sign followed by as many numerical digits as possible, and interprets them as a numerical value.

The string can contain additional characters after those that form the integral number, which are ignored and have no effect on the behavior of this function.

If the first sequence of non-whitespace characters in str is not a valid integral number, or if no such sequence exists because either str is empty or it contains only whitespace characters, no conversion is performed.

If no valid conversion could be performed, a zero value is returned.

Note:

Only the space character ' ' is considered as whitespace character.
Assume we are dealing with an environment which could only store integers within the 32-bit signed integer range: [¿231, 231 ¿ 1]. If the numerical value is out of the range of representable values, INT_MAX (231 ¿ 1) or INT_MIN (¿231) is returned.

Example 1:

Input: ""42""
Output: 42

Example 2:

Input: "" -42""
Output: -42
Explanation: The first non-whitespace character is '-', which is the minus sign.
Then take as many numerical digits as possible, which gets 42.

Example 3:

Input: ""4193 with words""
Output: 4193
Explanation: Conversion stops at digit '3' as the next character is not a numerical digit.

Example 4:

Input: ""words and 987""
Output: 0
Explanation: The first non-whitespace character is 'w', which is not a numerical
digit or a +/- sign. Therefore no valid conversion could be performed.

Example 5:

Input: ""-91283472332""
Output: -2147483648
Explanation: The number ""-91283472332"" is out of the range of a 32-bit signed integer.
Thefore INT_MIN (¿231) is returned."¿
9. Palindrome Number https://leetcode.com/problems/palindrome-number "Determine whether an integer is a palindrome. An integer is a palindrome when it reads the same backward as forward.

Example 1:

Input: 121
Output: true

Example 2:

Input: -121
Output: false
Explanation: From left to right, it reads -121. From right to left, it becomes 121-.
Therefore it is not a palindrome.

Example 3:

Input: 10
Output: false
Explanation: Reads 01 from right to left. Therefore it is not a palindrome.

Follow up:

Coud you solve it without converting the integer to a string?"¿
10. Regular Expression Matching https://leetcode.com/problems/regular-expression-matching "Given an input string (s) and a pattern (p), 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).

Note:

    s could be empty and contains only lowercase letters a-z.
    p could be empty and contains only lowercase letters a-z, and characters like . or *.

Example 1:

Input:
s = ""aa""
p = ""a""
Output: false
Explanation: ""a"" does not match the entire string ""aa"".

Example 2:

Input:
s = ""aa""
p = ""a*""
Output: true
Explanation: '*' means zero or more of the precedeng element, 'a'. Therefore, by repeating 'a' once, it becomes ""aa"".

Example 3:

Input:
s = ""ab""
p = "".*""
Output: true
Explanation: "".*"" means ""zero or more (*) of any character (.)"".

Example 4:

Input:
s = ""aab""
p = ""c*a*b""
Output: true
Explanation: c can be repeated 0 times, a can be repeated 1 time. Therefore it matches ""aab"".

Example 5:

Input:
s = ""mississippi""
p = ""mis*is*p*.""
Output: false"¿
11. Container With Most Water https://leetcode.com/problems/container-with-most-water "Given n non-negative integers a1, a2, ..., an, where each represents a point at coordinate (i, ai). n vertical lines are drawn such that the two endpoints of line i is at (i, ai) and (i, 0). Find two lines, which together with x-axis forms a container, such that the container contains the most water.

Note: You may not slant the container and n is at least 2."¿
12. Integer to Roman https://leetcode.com/problems/integer-to-roman "Roman numer

als are represented by seven different symbols: I, V, X, L, C, D and M.

Symbol	Value
I	1
V	5
X	10
L	50
C	100
D	500
M	1000

For example, two is written as II in Roman numeral, just two one's added together. T welve is written as, XII, which is simply X + II. The number twenty seven is written as XXVII, which is XX + V + II.

Roman numerals are usually written largest to smallest from left to right. However, the numeral for four is not IIII. Instead, the number four is written as IV. Because the one is before the five we subtract it making four. The same principle applies t o the number nine, which is written as IX. There are six instances where subtraction is used:

I can be placed before V (5) and X (10) to make 4 and 9.
X can be placed before L (50) and C (100) to make 40 and 90.
C can be placed before D (500) and M (1000) to make 400 and 900.

Given an integer, convert it to a roman numeral. Input is guaranteed to be within th e range from 1 to 3999.

Example 1:

Input: 3
Output: ""III""

Example 2:

Input: 4
Output: ""IV""

Example 3:

Input: 9
Output: ""IX""

Example 4:

Input: 58
Output: ""LVIII""
Explanation: C = 100, L = 50, XXX = 30 and III = 3.

Example 5:

Input: 1994
Output: ""MCMXCIV""
Explanation: M = 1000, CM = 900, XC = 90 and IV = 4."¿
13. Roman to Integer https://leetcode.com/problems/roman-to-integer "Roman numer als are represented by seven different symbols: I, V, X, L, C, D and M.

Symbol	Value
I	1
V	5
X	10
L	50
C	100
D	500
M	1000

For example, two is written as II in Roman numeral, just two one's added together. T welve is written as, XII, which is simply X + II. The number twenty seven is written as XXVII, which is XX + V + II.

Roman numerals are usually written largest to smallest from left to right. However, the numeral for four is not IIII. Instead, the number four is written as IV. Because the one is before the five we subtract it making four. The same principle applies to the number nine, which is written as IX. There are six instances where subtraction is used:

I can be placed before V (5) and X (10) to make 4 and 9.
X can be placed before L (50) and C (100) to make 40 and 90.
C can be placed before D (500) and M (1000) to make 400 and 900.

Given a roman numeral, convert it to an integer. Input is guaranteed to be within the range from 1 to 3999.

Example 1:

Input: ""III""
Output: 3

Example 2:

Input: ""IV""
Output: 4

Example 3:

Input: ""IX""
Output: 9

Example 4:

Input: ""LVIII""
Output: 58
Explanation: C = 100, L = 50, XXX = 30 and III = 3.

Example 5:

Input: ""MCMXCIV""
Output: 1994
Explanation: M = 1000, CM = 900, XC = 90 and IV = 4."¿
14. Longest Common Prefix https://leetcode.com/problems/longest-common-prefix "Write a function to find the longest common prefix string amongst an array of strings.

If there is no common prefix, return an empty string """".

Example 1:

Input: [""flower"",""flow"",""flight""]
Output: ""fl""

Example 2:

Input: [""dog"",""racecar"",""car""]
Output: """"
Explanation: There is no common prefix among the input strings.

Note:

All given inputs are in lowercase letters a-z."¿
15. 3Sum https://leetcode.com/problems/3sum "Given an array nums of n integers, are there elements a, b, c in nums such that a + b + c = 0? Find all unique triplets in the array which gives the sum of zero.

Note:

The solution set must not contain duplicate triplets.

Example:

Given array nums = [-1, 0, 1, 2, -1, -4],

A solution set is:
[
  [-1, 0, 1],
  [-1, -1, 2]
]"¿
16. 3Sum Closest https://leetcode.com/problems/3sum-closest "Given an array nums of n integers and an integer target, find three integers in nums such that the sum is closest to target. Return the sum of the three integers. You may assume that each input would have exactly one solution.

Example:

Given array nums = [-1, 2, 1, -4], and target = 1.

The sum that is closest to the target is 2. (-1 + 2 + 1 = 2)."¿
17. Letter Combinations of a Phone Number https://leetcode.com/problems/letter-combinations-of-a-phone-number "Given a string containing digits from 2-9 inclusive, return all possible letter combinations that the number could represent.

A mapping of digit to letters (just like on the telephone buttons) is given below. Note that 1 does not map to any letters.

Example:

Input: ""23""
Output: [""ad"", ""ae"", ""af"", ""bd"", ""be"", ""bf"", ""cd"", ""ce"", ""cf""].

Note:

Although the above answer is in lexicographical order, your answer could be in any order you want."¿
18. 4Sum https://leetcode.com/problems/4sum "Given an array nums of n integers and an integer target, are there elements a, b, c, and d in nums such that a + b + c + d = target? Find all unique quadruplets in the array which gives the sum of target.

Note:

The solution set must not contain duplicate quadruplets.

Example:

Given array nums = [1, 0, -1, 0, -2, 2], and target = 0.

A solution set is:
[
  [-1, 0, 0, 1],
  [-2, -1, 1, 2],
  [-2, 0, 0, 2]
]"¿
19. Remove Nth Node From End of List https://leetcode.com/problems/remove-nth-node-from-end-of-list "Given a linked list, remove the n-th node from the end of list and return its head.

Example:

Given linked list: 1->2->3->4->5, and n = 2.

After removing the second node from the end, the linked list becomes 1->2->3->5.

Note:

Given n will always be valid.

Follow up:

Could you do this in one pass?"¿

20. Valid Parentheses https://leetcode.com/problems/valid-parentheses "Given a str
ing containing just the characters '(', ')', '{', '}', '[' and ']', determine if the
 input string is valid.

An input string is valid if:

    Open brackets must be closed by the same type of brackets.
    Open brackets must be closed in the correct order.

Note that an empty string is also considered valid.

Example 1:

Input: ""()""
Output: true

Example 2:

Input: ""()[]{}""
Output: true

Example 3:

Input: ""(]""
Output: false

Example 4:

Input: ""([)]""
Output: false

Example 5:

Input: ""{[]}""
Output: true"¿
21. Merge Two Sorted Lists https://leetcode.com/problems/merge-two-sorted-lists
"Merge two sorted linked lists and return it as a new list. The new list should be m
ade by splicing together the nodes of the first two lists.

Example:
Input: 1->2->4, 1->3->4
Output: 1->1->2->3->4->4"¿
22. Generate Parentheses https://leetcode.com/problems/generate-parentheses "Giv
en n pairs of parentheses, write a function to generate all combinations of well-for
med parentheses.

For example, given n = 3, a solution set is:

[
  ""((()))"",
  ""(()())"",
  ""(())()"",
  ""()(())"",
  ""()()()""
]"¿
23. Merge k Sorted Lists https://leetcode.com/problems/merge-k-sorted-lists "Mer
ge k sorted linked lists and return it as one sorted list. Analyze and describe its
complexity.

Example:

Input:
[
  1->4->5,
  1->3->4,

  2->6
]
Output: 1->1->2->3->4->4->5->6"¿
24. Swap Nodes in Pairs https://leetcode.com/problems/swap-nodes-in-pairs "Given a linked list, swap every two adjacent nodes and return its head.

Example:

Given 1->2->3->4, you should return the list as 2->1->4->3.

Note:

    Your algorithm should use only constant extra space.
    You may not modify the values in the list's nodes, only nodes itself may be changed."¿
25. Reverse Nodes in k-Group https://leetcode.com/problems/reverse-nodes-in-k-group "Given a linked list, reverse the nodes of a linked list k at a time and return its 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.

Example:

Given this linked list: 1->2->3->4->5

For k = 2, you should return: 2->1->4->3->5

For k = 3, you should return: 3->2->1->4->5

Note:

    Only constant extra memory is allowed.
    You may not alter the values in the list's nodes, only nodes itself may be changed."¿
26. Remove Duplicates from Sorted Array https://leetcode.com/problems/remove-duplicates-from-sorted-array "Given a sorted array nums, remove the duplicates in-place such that each element appear only once and return the new length.

Do not allocate extra space for another array, you must do this by modifying the input array in-place with O(1) extra memory.

Example 1:

Given nums = [1,1,2],

Your function should return length = 2, with the first two elements of nums being 1 and 2 respectively.

It doesn't matter what you leave beyond the returned length.

Example 2:

Given nums = [0,0,1,1,1,2,2,3,3,4],

Your function should return length = 5, with the first five elements of nums being modified to 0, 1, 2, 3, and 4 respectively.

It doesn't matter what values are set beyond the returned length.

Clarification:

Confused why the returned value is an integer but your answer is an array?

Note that the input array is passed in by reference, which means modification to the input array will be known to the caller as well.

Internally you can think of this:

```
// nums is passed in by reference. (i.e., without making a copy)
int len = removeDuplicates(nums);

// any modification to nums in your function would be known by the caller.
// using the length returned by your function, it prints the first len elements.
for (int i = 0; i < len; i++) {
    print(nums[i]);
}"¿
```

27. Remove Element https://leetcode.com/problems/remove-element "Given an array nums and a value val, remove all instances of that value in-place and return the new length.

Do not allocate extra space for another array, you must do this by modifying the input array in-place with O(1) extra memory.

The order of elements can be changed. It doesn't matter what you leave beyond the new length.

Example 1:

Given nums = [3,2,2,3], val = 3,

Your function should return length = 2, with the first two elements of nums being 2.

It doesn't matter what you leave beyond the returned length.

Example 2:

Given nums = [0,1,2,2,3,0,4,2], val = 2,

Your function should return length = 5, with the first five elements of nums containing 0, 1, 3, 0, and 4.

Note that the order of those five elements can be arbitrary.

It doesn't matter what values are set beyond the returned length.

Clarification:

Confused why the returned value is an integer but your answer is an array?

Note that the input array is passed in by reference, which means modification to the input array will be known to the caller as well.

Internally you can think of this:

```
// nums is passed in by reference. (i.e., without making a copy)
int len = removeElement(nums, val);

// any modification to nums in your function would be known by the caller.
// using the length returned by your function, it prints the first len elements.
for (int i = 0; i < len; i++) {
    print(nums[i]);
}"¿
```

28. Implement strStr() https://leetcode.com/problems/implement-strstr "Implement strStr().

Return the index of the first occurrence of needle in haystack, or -1 if needle is not part of haystack.

Example 1:

```
Input: haystack = ""hello"", needle = ""ll""
Output: 2
```

Example 2:

```
Input: haystack = ""aaaaa"", needle = ""bba""
```

Output: -1

Clarification:

What should we return when needle is an empty string? This is a great question to as
k during an interview.

For the purpose of this problem, we will return 0 when needle is an empty string. Th
is is consistent to C's strstr() and Java's indexOf()."¿
29. Divide Two Integers https://leetcode.com/problems/divide-two-integers "Given t
wo integers dividend and divisor, divide two integers without using multiplication,
division and mod operator.

Return the quotient after dividing dividend by divisor.

The integer division should truncate toward zero.

Example 1:

Input: dividend = 10, divisor = 3
Output: 3

Example 2:

Input: dividend = 7, divisor = -3
Output: -2

Note:

    Both dividend and divisor will be 32-bit signed integers.
    The divisor will never be 0.
    Assume we are dealing with an environment which could only store integers within
 the 32-bit signed integer range: [¿231, 231 ¿ 1]. For the purpose of this problem,
 assume that your function returns 231 ¿ 1 when the division result overflows."¿
30. Substring with Concatenation of All Words https://leetcode.com/problems/substr
ing-with-concatenation-of-all-words "You are given a string, s, and a list of words,
 words, that are all of the same length. Find all starting indices of substring(s) i
n s that is a concatenation of each word in words exactly once and without any inter
vening characters.

Example 1:

Input:
  s = ""barfoothefoobarman"",
  words = [""foo"",""bar""]
Output: [0,9]
Explanation: Substrings starting at index 0 and 9 are ""barfoor"" and ""foobar"" res
pectively.
The output order does not matter, returning [9,0] is fine too.

Example 2:

Input:
  s = ""wordgoodstudentgoodword"",
  words = [""word"",""student""]
Output: []"¿
31. Next Permutation https://leetcode.com/problems/next-permutation "Implement n
ext permutation, which rearranges numbers into the lexicographically next greater pe
rmutation of numbers.

If such arrangement is not possible, it must rearrange it as the lowest possible ord
er (ie, sorted in ascending order).

The replacement must be in-place and use only constant extra memory.

Here are some examples. Inputs are in the left-hand column and its corresponding out
puts are in the right-hand column.

1,2,3 ¿ 1,3,2

3,2,1 ¿ 1,2,3

1,1,5 ¿ 1,5,1"¿
32. Longest Valid Parentheses https://leetcode.com/problems/longest-valid-parentheses "Given a string containing just the characters '(' and ')', find the length of the longest valid (well-formed) parentheses substring.

Example 1:

Input: ""(()""
Output: 2
Explanation: The longest valid parentheses substring is ""()""

Example 2:

Input: "")()())""
Output: 4
Explanation: The longest valid parentheses substring is ""()()""""¿
33. Search in Rotated Sorted Array https://leetcode.com/problems/search-in-rotated-sorted-array "Suppose an array sorted in ascending order is rotated at some pivot unknown to you beforehand.

(i.e., [0,1,2,4,5,6,7] might become [4,5,6,7,0,1,2]).

You are given a target value to search. If found in the array return its index, otherwise return -1.

You may assume no duplicate exists in the array.

Your algorithm's runtime complexity must be in the order of O(log n).

Example 1:

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

Example 2:

Input: nums = [4,5,6,7,0,1,2], target = 3
Output: -1"¿
34. Search for a Range https://leetcode.com/problems/search-for-a-range "Given an array of integers nums sorted in ascending order, find the starting and ending position of a given target value.

Your algorithm's runtime complexity must be in the order of O(log n).

If the target is not found in the array, return [-1, -1].

Example 1:

Input: nums = [5,7,7,8,8,10], target = 8
Output: [3,4]

Example 2:

Input: nums = [5,7,7,8,8,10], target = 6
Output: [-1,-1]"¿
35. Search Insert Position https://leetcode.com/problems/search-insert-position "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 if it were inserted in order.

You may assume no duplicates in the array.

Example 1:

Input: [1,3,5,6], 5
Output: 2

Example 2:

```
Input: [1,3,5,6], 2
Output: 1


Example 3:

Input: [1,3,5,6], 7
Output: 4


Example 4:

Input: [1,3,5,6], 0
Output: 0"¿
36. Valid Sudoku    https://leetcode.com/problems/valid-sudoku  "Determine if a 9x9
Sudoku board is valid. Only the filled cells need to be validated according to the f
ollowing rules:


    Each row must contain the digits 1-9 without repetition.
    Each column must contain the digits 1-9 without repetition.
    Each of the 9 3x3 sub-boxes of the grid must contain the digits 1-9 without repe
tition.



A partially filled sudoku which is valid.

The Sudoku board could be partially filled, where empty cells are filled with the ch
aracter '.'.

Example 1:

Input:
[
  [""5"",""3"","".","","".","",""7"","".","","".","","".","".""],
  [""6"","".","","".","",""1"",""9"","".""5"","".","","".","".""],
  ["".","",""9"",""8"","".","","".","","".","","".","6"","".""],
  [""8"","".","","".","","".","",""6"","".","","".","","".""3""],
  [""4"","".","","".","",""8"","".","",""3"","".","","".","",""1""],
  [""7"","".","","".","","".","",""2"","".","","".","","".""6""],
  ["".","",""6"","".","","".","","".","","".","",""2"","",""8"","".","".""],
  ["".","","".","","".","",""4"","",""1"","",""9"","".","","".","",""5""],
  ["".","".","","".","","".","",""8"","".","","".","",""7"","",""9""]
]
Output: true


Example 2:

Input:
[
  [""8"","",""3"","".","","".","",""7"","".","","".","","".","".""],
  [""6"","".","","".","",""1"","",""9"","",""5"","".","","".","".""],
  ["".","",""9"","",""8"","".","","".","","".","","".","6"","".""],
  [""8"","".","","".","","".","",""6"","".","","".","","".""3""],
  [""4"","".","","".","",""8"","".","",""3"","".","","".","",""1""],
  [""7"","".","","".","","".","",""2"","".","","".","","".""6""],
  ["".","",""6"","".","","".","","".","","".","",""2"","",""8"","".","".""],
  ["".","","".","","".","",""4"","",""1"","",""9"","".","","".","",""5""],
  ["".","".","","".","","".","",""8"","".","","".","",""7"","",""9""]
]
Output: false
Explanation: Same as Example 1, except with the 5 in the top left corner being
    modified to 8. Since there are two 8's in the top left 3x3 sub-box, it is invali
d.


Note:


    A Sudoku board (partially filled) could be valid but is not necessarily solvable
```

.
    Only the filled cells need to be validated according to the mentioned rules.
    The given board contain only digits 1-9 and the character '.'.
    The given board size is always 9x9."¿
37. Sudoku Solver   https://leetcode.com/problems/sudoku-solver "Write a program to solve a Sudoku puzzle by filling the empty cells.

A sudoku solution must satisfy all of the following rules:

    Each of the digits 1-9 must occur exactly once in each row.
    Each of the digits 1-9 must occur exactly once in each column.
    Each of the the digits 1-9 must occur exactly once in each of the 9 3x3 sub-boxes of the grid.

Empty cells are indicated by the character '.'.

A sudoku puzzle...

...and its solution numbers marked in red.

Note:

    The given board contain only digits 1-9 and the character '.'.
    You may assume that the given Sudoku puzzle will have a single unique solution.
    The given board size is always 9x9."¿
38. Count and Say   https://leetcode.com/problems/count-and-say "The count-and-say sequence is the sequence of integers with the first five terms as following:
1.   1
2.   11
3.   21
4.   1211
5.   111221

1 is read off as ""one 1"" or 11.

11 is read off as ""two 1s"" or 21.

21 is read off as ""one 2, then one 1"" or 1211.

Given an integer n, generate the nth term of the count-and-say sequence.

Note: Each term of the sequence of integers will be represented as a string.

Example 1:
Input: 1
Output: ""1""

Example 2:
Input: 4
Output: ""1211"""¿
39. Combination Sum https://leetcode.com/problems/combination-sum   "Given a set of candidate numbers (candidates) (without duplicates) and a target number (target), find all unique combinations in candidates where the candidate numbers sums to target.

The same repeated number may be chosen from candidates unlimited number of times.

Note:

    All numbers (including target) will be positive integers.
    The solution set must not contain duplicate combinations.

Example 1:

```
Input: candidates = [2,3,6,7], target = 7,
A solution set is:
[
  [7],
  [2,2,3]
]
```

Example 2:

```
Input: candidates = [2,3,5], target = 8,
A solution set is:
[
  [2,2,2,2],
  [2,3,3],
  [3,5]
]"¿
```

40. Combination Sum II https://leetcode.com/problems/combination-sum-ii "Given a collection of candidate numbers (candidates) and a target number (target), find all unique combinations in candidates where the candidate numbers sums to target.

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

Note:

    All numbers (including target) will be positive integers.
    The solution set must not contain duplicate combinations.

Example 1:

```
Input: candidates = [10,1,2,7,6,1,5], target = 8,
A solution set is:
[
  [1, 7],
  [1, 2, 5],
  [2, 6],
  [1, 1, 6]
]
```

Example 2:

```
Input: candidates = [2,5,2,1,2], target = 5,
A solution set is:
[
  [1,2,2],
  [5]
]"¿
```

41. First Missing Positive https://leetcode.com/problems/first-missing-positive "Given an unsorted integer array, find the smallest missing positive integer.

Example 1:

```
Input: [1,2,0]
Output: 3
```

Example 2:

```
Input: [3,4,-1,1]
Output: 2
```

Example 3:

Input: [7,8,9,11,12]
Output: 1

Note:

Your algorithm should run in O(n) time and uses constant extra space."¿
42. Trapping Rain Water https://leetcode.com/problems/trapping-rain-water "Given n non-negative integers representing an elevation map where the width of each bar is 1, compute how much water it is able to trap after raining.

The above elevation map is represented by array [0,1,0,2,1,0,1,3,2,1,2,1]. In this case, 6 units of rain water (blue section) are being trapped. Thanks Marcos for contributing this image!

Example:

Input: [0,1,0,2,1,0,1,3,2,1,2,1]
Output: 6"¿
43. Multiply Strings https://leetcode.com/problems/multiply-strings "Given two non-negative integers num1 and num2 represented as strings, return the product of num1 and num2, also represented as a string.

Example 1:

Input: num1 = ""2"", num2 = ""3""
Output: ""6""

Example 2:

Input: num1 = ""123"", num2 = ""456""
Output: ""56088""

Note:

The length of both num1 and num2 is < 110.
Both num1 and num2 contain only digits 0-9.
Both num1 and num2 do not contain any leading zero, except the number 0 itself.
You must not use any built-in BigInteger library or convert the inputs to integer directly."¿
44. Wildcard Matching https://leetcode.com/problems/wildcard-matching "Given an input string (s) and a pattern (p), implement wildcard pattern matching with support for '?' and '*'.

'?' Matches any single character.
'*' Matches any sequence of characters (including the empty sequence).

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

Note:

s could be empty and contains only lowercase letters a-z.
p could be empty and contains only lowercase letters a-z, and characters like ? or *.

Example 1:

Input:
s = ""aa""
p = ""a""
Output: false
Explanation: ""a"" does not match the entire string ""aa"".

Example 2:

Input:
s = ""aa""
p = ""*""
Output: true
Explanation: '*' matches any sequence.

Example 3:

Input:
s = ""cb""
p = ""?a""
Output: false
Explanation: '?' matches 'c', but the second letter is 'a', which does not match 'b'
.

Example 4:

Input:
s = ""adceb""
p = ""*a*b""
Output: true
Explanation: The first '*' matches the empty sequence, while the second '*' matches
the substring ""dce"".

Example 5:

Input:
s = ""acdcb""
p = ""a*c?b""
Output: false"¿
45. Jump Game II https://leetcode.com/problems/jump-game-ii "Given an array of n
on-negative integers, you are initially positioned at the first index of the array.

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

Your goal is to reach the last index in the minimum number of jumps.

Example:

Input: [2,3,1,1,4]
Output: 2
Explanation: The minimum number of jumps to reach the last index is 2.
    Jump 1 step from index 0 to 1, then 3 steps to the last index.

Note:

You can assume that you can always reach the last index."¿
46. Permutations https://leetcode.com/problems/permutations "Given a collection
of distinct integers, return all possible permutations.

Example:

Input: [1,2,3]
Output:
[
  [1,2,3],
  [1,3,2],
  [2,1,3],
  [2,3,1],
  [3,1,2],
  [3,2,1]
]"¿
47. Permutations II https://leetcode.com/problems/permutations-ii "Given a collect
ion of numbers that might contain duplicates, return all possible unique permutation
s.

Example:

```
Input: [1,1,2]
Output:
[
  [1,1,2],
  [1,2,1],
  [2,1,1]
]"¿
48. Rotate Image    https://leetcode.com/problems/rotate-image  "You are given an n
x n 2D matrix representing an image.

Rotate the image by 90 degrees (clockwise).

Note:

You have to rotate the image in-place, which means you have to modify the input 2D m
atrix directly. DO NOT allocate another 2D matrix and do the rotation.

Example 1:

Given input matrix =
[
  [1,2,3],
  [4,5,6],
  [7,8,9]
],

rotate the input matrix in-place such that it becomes:
[
  [7,4,1],
  [8,5,2],
  [9,6,3]
]


Example 2:

Given input matrix =
[
  [ 5, 1, 9,11],
  [ 2, 4, 8,10],
  [13, 3, 6, 7],
  [15,14,12,16]
],

rotate the input matrix in-place such that it becomes:
[
  [15,13, 2, 5],
  [14, 3, 4, 1],
  [12, 6, 8, 9],
  [16, 7,10,11]
]"¿
49. Group Anagrams  https://leetcode.com/problems/group-anagrams    "Given an array
of strings, group anagrams together.

Example:

Input: [""eat"", ""tea"", ""tan"", ""ate"", ""nat"", ""bat""],
Output:
[
  [""ate"",""eat"",""tea""],
  [""nat"",""tan""],
  [""bat""]
]

Note:


    All inputs will be in lowercase.
    The order of your output does not matter."¿
"50. Pow(x, n)" https://leetcode.com/problems/powx-n    "Implement pow(x, n), which
calculates x raised to the power n (xn).
```

Example 1:

Input: 2.00000, 10
Output: 1024.00000

Example 2:

Input: 2.10000, 3
Output: 9.26100

Example 3:

Input: 2.00000, -2
Output: 0.25000
Explanation: 2-2 = 1/22 = 1/4 = 0.25

Note:

-100.0 < x < 100.0
n is a 32-bit signed integer, within the range [¿231, 231 ¿ 1]"¿
51. N-Queens https://leetcode.com/problems/n-queens "The n-queens puzzle is the problem of placing n queens on an n×n chessboard such that no two queens attack each other.

Given an integer n, return all distinct solutions to the n-queens puzzle.

Each solution contains a distinct board configuration of the n-queens' placement, where 'Q' and '.' both indicate a queen and an empty space respectively.

Example:

```
Input: 4
Output: [
 [".Q..",  // Solution 1
  "...Q",
  "Q...",
  "..Q."],

 ["..Q.",  // Solution 2
  "Q...",
  "...Q",
  ".Q.."]
]
```
Explanation: There exist two distinct solutions to the 4-queens puzzle as shown above."¿
52. N-Queens II https://leetcode.com/problems/n-queens-ii "The n-queens puzzle is the problem of placing n queens on an n×n chessboard such that no two queens attack each other.

Given an integer n, return the number of distinct solutions to the n-queens puzzle.

Example:

```
Input: 4
Output: 2
Explanation: There are two distinct solutions to the 4-queens puzzle as shown below.
[
 [".Q..",  // Solution 1
  "...Q",
  "Q...",
  "..Q."],

 ["..Q.",  // Solution 2
  "Q...",
  "...Q",
```

```
  "".Q.""]
]"¿
```
53. Maximum Subarray https://leetcode.com/problems/maximum-subarray "Given an in
teger array nums, find the contiguous subarray (containing at least one number) whic
h has the largest sum and return its sum.

Example:

```
Input: [-2,1,-3,4,-1,2,1,-5,4],
Output: 6
Explanation: [4,-1,2,1] has the largest sum = 6.
```

Follow up:

If you have figured out the O(n) solution, try coding another solution using the div
ide and conquer approach, which is more subtle."¿
54. Spiral Matrix https://leetcode.com/problems/spiral-matrix "Given a matrix of m
 x n elements (m rows, n columns), return all elements of the matrix in spiral order
.

Example 1:

```
Input:
[
 [ 1, 2, 3 ],
 [ 4, 5, 6 ],
 [ 7, 8, 9 ]
]
Output: [1,2,3,6,9,8,7,4,5]
```

Example 2:
```
Input:
[
  [1, 2, 3, 4],
  [5, 6, 7, 8],
  [9,10,11,12]
]
Output: [1,2,3,4,8,12,11,10,9,5,6,7]"¿
```
55. Jump Game https://leetcode.com/problems/jump-game "Given an array of non-negat
ive integers, you are initially positioned at the first 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.

Example 1:

```
Input: [2,3,1,1,4]
Output: true
Explanation: Jump 1 step from index 0 to 1, then 3 steps to the last index.
```

Example 2:

```
Input: [3,2,1,0,4]
Output: false
Explanation: You will always arrive at index 3 no matter what. Its maximum
             jump length is 0, which makes it impossible to reach the last index."¿
```
56. Merge Intervals https://leetcode.com/problems/merge-intervals "Given a collect
ion of intervals, merge all overlapping intervals.

Example 1:

```
Input: [[1,3],[2,6],[8,10],[15,18]]
Output: [[1,6],[8,10],[15,18]]
Explanation: Since intervals [1,3] and [2,6] overlaps, merge them into [1,6].
```

Example 2:

```
Input: [[1,4],[4,5]]
```

Output: [[1,5]]
Explanation: Intervals [1,4] and [4,5] are considerred overlapping."¿
57. Insert Interval https://leetcode.com/problems/insert-interval "Given a set of non-overlapping intervals, insert a new interval into the intervals (merge if necessary).

You may assume that the intervals were initially sorted according to their start times.

Example 1:

Input: intervals = [[1,3],[6,9]], newInterval = [2,5]
Output: [[1,5],[6,9]]

Example 2:

Input: intervals = [[1,2],[3,5],[6,7],[8,10],[12,16]], newInterval = [4,8]
Output: [[1,2],[3,10],[12,16]]
Explanation: Because the new interval [4,8] overlaps with [3,5],[6,7],[8,10]."¿
58. Length of Last Word https://leetcode.com/problems/length-of-last-word "Given a string s consists of upper/lower-case alphabets and empty space characters ' ', return the length of last word in the string.

If the last word does not exist, return 0.

Note: A word is defined as a character sequence consists of non-space characters only.

Example:
Input: ""Hello World""
Output: 5"¿
59. Spiral Matrix II https://leetcode.com/problems/spiral-matrix-ii "Given a positive integer n, generate a square matrix filled with elements from 1 to n2 in spiral order.

Example:

Input: 3
Output:
[
 [1, 2, 3],
 [8, 9, 4],
 [7, 6, 5]
]"¿
60. Permutation Sequence https://leetcode.com/problems/permutation-sequence "The set [1,2,3,...,n] contains a total of n! unique permutations.

By listing and labeling all of the permutations in order, we get the following sequence for n = 3:

    ""123""
    ""132""
    ""213""
    ""231""
    ""312""
    ""321""

Given n and k, return the kth permutation sequence.

Note:

    Given n will be between 1 and 9 inclusive.
    Given k will be between 1 and n! inclusive.

Example 1:

Input: n = 3, k = 3
Output: ""213""

Example 2:

Input: n = 4, k = 9
Output: ""2314"""¿
61. Rotate List https://leetcode.com/problems/rotate-list "Given a linked list, ro
tate the list to the right by k places, where k is non-negative.

Example 1:

Input: 1->2->3->4->5->NULL, k = 2
Output: 4->5->1->2->3->NULL
Explanation:
rotate 1 steps to the right: 5->1->2->3->4->NULL
rotate 2 steps to the right: 4->5->1->2->3->NULL

Example 2:

Input: 0->1->2->NULL, k = 4
Output: 2->0->1->NULL
Explanation:
rotate 1 steps to the right: 2->0->1->NULL
rotate 2 steps to the right: 1->2->0->NULL
rotate 3 steps to the right: 0->1->2->NULL
rotate 4 steps to the right: 2->0->1->NULL"¿
62. Unique Paths https://leetcode.com/problems/unique-paths "A robot is located
at the top-left corner of a m x n grid (marked 'Start' in the diagram below).

The robot can only move either down or right at any point in time. The robot is tryi
ng to reach the bottom-right corner of the grid (marked 'Finish' in the diagram belo
w).

How many possible unique paths are there?

Above is a 7 x 3 grid. How many possible unique paths are there?

Note: m and n will be at most 100.

Example 1:

Input: m = 3, n = 2
Output: 3
Explanation:
From the top-left corner, there are a total of 3 ways to reach the bottom-right corn
er:
1. Right -> Right -> Down
2. Right -> Down -> Right
3. Down -> Right -> Right

Example 2:

Input: m = 7, n = 3
Output: 28"¿
63. Unique Paths II https://leetcode.com/problems/unique-paths-ii "A robot is loca
ted at the top-left corner of a m x n grid (marked 'Start' in the diagram below).

The robot can only move either down or right at any point in time. The robot is tryi
ng to reach the bottom-right corner of the grid (marked 'Finish' in the diagram belo
w).

Now consider if some obstacles are added to the grids. How many unique paths would t
here be?

An obstacle and empty space is marked as 1 and 0 respectively in the grid.

Note: m and n will be at most 100.

Example 1:

Input:
[
  [0,0,0],
  [0,1,0],
  [0,0,0]
]
Output: 2
Explanation:
There is one obstacle in the middle of the 3x3 grid above.
There are two ways to reach the bottom-right corner:
1. Right -> Right -> Down -> Down
2. Down -> Down -> Right -> Right"¿
64. Minimum Path Sum https://leetcode.com/problems/minimum-path-sum "Given a m x n grid filled with non-negative numbers, find a path from top left to bottom right which minimizes the sum of all numbers along its path.

Note: You can only move either down or right at any point in time.

Example:

Input:
[
  [1,3,1],
  [1,5,1],
  [4,2,1]
]
Output: 7
Explanation: Because the path 1¿3¿1¿1¿1 minimizes the sum."¿
65. Valid Number https://leetcode.com/problems/valid-number "Validate if a given string is numeric.

Some examples:

""0"" => true

"" 0.1 "" => true

""abc"" => false

""1 a"" => false

""2e10"" => true

Note: It is intended for the problem statement to be ambiguous. You should gather all requirements up front before implementing one.

Update (2015-02-10):

The signature of the C++ function had been updated. If you still see your function signature accepts a const char * argument, please click the reload button to reset your code definition."¿
66. Plus One https://leetcode.com/problems/plus-one "Given a non-empty array of digits representing a non-negative integer, plus one to the integer.

The digits are stored such that the most significant digit is at the head of the list, and each element in the array contain a single digit.

You may assume the integer does not contain any leading zero, except the number 0 itself.

Example 1:

Input: [1,2,3]
Output: [1,2,4]
Explanation: The array represents the integer 123.

Example 2:

Input: [4,3,2,1]

```
Output: [4,3,2,2]
Explanation: The array represents the integer 4321."¿
67. Add Binary  https://leetcode.com/problems/add-binary    "Given two binary string
s, return their sum (also a binary string).

The input strings are both non-empty and contains only characters 1 or 0.

Example 1:

Input: a = ""11"", b = ""1""
Output: ""100""

Example 2:

Input: a = ""1010"", b = ""1011""
Output: ""10101""¿
68. Text Justification  https://leetcode.com/problems/text-justification    "Given a
n array of words and a width maxWidth, format the text such that each line has exact
ly maxWidth characters and is fully (left and right) justified.

You should pack your words in a greedy approach; that is, pack as many words as you
can in each line. Pad extra spaces ' ' when necessary so that each line has exactly
maxWidth characters.

Extra spaces between words should be distributed as evenly as possible. If the numbe
r of spaces on a line do not divide evenly between words, the empty slots on the lef
t will be assigned more spaces than the slots on the right.

For the last line of text, it should be left justified and no extra space is inserte
d between words.

Note:


    A word is defined as a character sequence consisting of non-space characters onl
y.
    Each word's length is guaranteed to be greater than 0 and not exceed maxWidth.
    The input array words contains at least one word.


Example 1:

Input:
words = [""This"", ""is"", ""an"", ""example"", ""of"", ""text"", ""justification.""
]
maxWidth = 16
Output:
[
   ""This    is    an"",
   ""example  of text"",
   ""justification.  ""
]


Example 2:

Input:
words = [""What"",""must"",""be"",""acknowledgment"",""shall"",""be""]
maxWidth = 16
Output:
[
  ""What   must   be"",
  ""acknowledgment  "",
  ""shall be        ""
]
Explanation: Note that the last line is ""shall be    "" instead of ""shall     be""
,
             because the last line must be left-justified instead of fully-justified
.
             Note that the second line is also left-justified becase it contains onl
y one word.
```

Example 3:

Input:
words = [""Science"",""is"",""what"",""we"",""understand"",""well"",""enough"",""to"
","explain"",
         ""to"",""a"",""computer."",""Art"",""is"",""everything"",""else"",""we"",""
do""]
maxWidth = 20
Output:
[
  ""Science is what we"",
  ""understand   well"",
  ""enough to explain to"",
  ""a computer. Art is"",
  ""everything else we"",
  ""do   ""
]"¿
69. Sqrt(x) https://leetcode.com/problems/sqrtx "Implement int sqrt(int x).

Compute and return the square root of x, where x is guaranteed to be a non-negative integer.

Since the return type is an integer, the decimal digits are truncated and only the i nteger part of the result is returned.

Example 1:

Input: 4
Output: 2

Example 2:

Input: 8
Output: 2
Explanation: The square root of 8 is 2.82842..., and since
             the decimal part is truncated, 2 is returned."¿
70. Climbing Stairs https://leetcode.com/problems/climbing-stairs   "You are climbin g a stair case. It takes n 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?

Note: Given n will be a positive integer.

Example 1:

Input: 2
Output: 2
Explanation: There are two ways to climb to the top.
1. 1 step + 1 step
2. 2 steps

Example 2:

Input: 3
Output: 3
Explanation: There are three ways to climb to the top.
1. 1 step + 1 step + 1 step
2. 1 step + 2 steps
3. 2 steps + 1 step"¿
71. Simplify Path   https://leetcode.com/problems/simplify-path "Given an absolute p ath for a file (Unix-style), simplify it.

For example,

path = ""/home/"", => ""/home""

path = ""/a/./b/../../c/"", => ""/c""

click to show corner cases.

Corner Cases:

Did you consider the case where path = ""/../""?

In this case, you should return ""/"".
Another corner case is the path might contain multiple slashes '/' together, such as ""/home//foo/"".

In this case, you should ignore redundant slashes and return ""/home/foo""."¿
72. Edit Distance https://leetcode.com/problems/edit-distance "Given two words word1 and word2, find the minimum number of operations required to convert word1 to word2.

You have the following 3 operations permitted on a word:

Insert a character
Delete a character
Replace a character

Example 1:

Input: word1 = ""horse"", word2 = ""ros""
Output: 3
Explanation:
horse -> rorse (replace 'h' with 'r')
rorse -> rose (remove 'r')
rose -> ros (remove 'e')

Example 2:

Input: word1 = ""intention"", word2 = ""execution""
Output: 5
Explanation:
intention -> inention (remove 't')
inention -> enention (replace 'i' with 'e')
enention -> exention (replace 'n' with 'x')
exention -> exection (replace 'n' with 'c')
exection -> execution (insert 'u')"¿
73. Set Matrix Zeroes https://leetcode.com/problems/set-matrix-zeroes "Given a m x n matrix, if an element is 0, set its entire row and column to 0. Do it in-place.

Example 1:

Input:
[
  [1,1,1],
  [1,0,1],
  [1,1,1]
]
Output:
[
  [1,0,1],
  [0,0,0],
  [1,0,1]
]

Example 2:

Input:
[
  [0,1,2,0],
  [3,4,5,2],
  [1,3,1,5]
]

```
Output:
[
  [0,0,0,0],
  [0,4,5,0],
  [0,3,1,0]
]
```

Follow up:

A straight forward solution using O(mn) space is probably a bad idea.
A simple improvement uses O(m + n) space, but still not the best solution.
Could you devise a constant space solution?"¿
74. Search a 2D Matrix https://leetcode.com/problems/search-a-2d-matrix "Write a n efficient algorithm that searches for a value in an m x n 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 r ow.

Example 1:

```
Input:
matrix = [
  [1,   3,  5,  7],
  [10, 11, 16, 20],
  [23, 30, 34, 50]
]
target = 3
Output: true
```

Example 2:

```
Input:
matrix = [
  [1,   3,  5,  7],
  [10, 11, 16, 20],
  [23, 30, 34, 50]
]
target = 13
Output: false"¿
```

75. Sort Colors https://leetcode.com/problems/sort-colors "Given an array with n o bjects colored red, white or blue, sort them in-place so that objects of the same co lor are adjacent, with the colors in the order red, white and blue.

Here, we will use the integers 0, 1, and 2 to represent the color red, white, and bl ue respectively.

Note: You are not suppose to use the library's sort function for this problem.

Example:

```
Input: [2,0,2,1,1,0]
Output: [0,0,1,1,2,2]
```

Follow up:

A rather straight forward solution is a two-pass algorithm using counting sort.

First, iterate the array counting number of 0's, 1's, and 2's, then overwrite ar ray with total number of 0's, then 1's and followed by 2's.
Could you come up with a one-pass algorithm using only constant space?"¿
76. Minimum Window Substring https://leetcode.com/problems/minimum-window-substri ng "Given a string S and a string T, find the minimum window in S which will contai n all the characters in T in complexity O(n).

Example:

Input: S = ""ADOBECODEBANC"", T = ""ABC""
Output: ""BANC""

Note:

    If there is no such window in S that covers all characters in T, return the empt
y string """".
    If there is such window, you are guaranteed that there will always be only one u
nique minimum window in S."¿
77. Combinations   https://leetcode.com/problems/combinations "Given two integers
n and k, return all possible combinations of k numbers out of 1 ... n.

Example:

Input: n = 4, k = 2
Output:
[
  [2,4],
  [3,4],
  [2,3],
  [1,2],
  [1,3],
  [1,4],
]"¿
78. Subsets https://leetcode.com/problems/subsets   "Given a set of distinct integer
s, nums, return all possible subsets (the power set).

Note: The solution set must not contain duplicate subsets.

Example:

Input: nums = [1,2,3]
Output:
[
  [3],
  [1],
  [2],
  [1,2,3],
  [1,3],
  [2,3],
  [1,2],
  []
]"¿
79. Word Search https://leetcode.com/problems/word-search   "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 ""adja
cent"" cells are those horizontally or vertically neighboring. The same letter cell
may not be used more than once.

Example:

board =
[
  ['A','B','C','E'],
  ['S','F','C','S'],
  ['A','D','E','E']
]

Given word = ""ABCCED"", return true.
Given word = ""SEE"", return true.
Given word = ""ABCB"", return false."¿
80. Remove Duplicates from Sorted Array II https://leetcode.com/problems/remove-dup
licates-from-sorted-array-ii   "Given a sorted array nums, remove the duplicates in
-place such that duplicates appeared at most twice and return the new length.

Do not allocate extra space for another array, you must do this by modifying the inp
ut array in-place with O(1) extra memory.

Example 1:

Given nums = [1,1,1,2,2,3],

Your function should return length = 5, with the first five elements of nums being 1 , 1, 2, 2 and 3 respectively.

It doesn't matter what you leave beyond the returned length.

Example 2:

Given nums = [0,0,1,1,1,1,2,3,3],

Your function should return length = 7, with the first seven elements of nums being modified to 0, 0, 1, 1, 2, 3 and 3 respectively.

It doesn't matter what values are set beyond the returned length.

Clarification:

Confused why the returned value is an integer but your answer is an array?

Note that the input array is passed in by reference, which means modification to the input array will be known to the caller as well.

Internally you can think of this:

```
// nums is passed in by reference. (i.e., without making a copy)
int len = removeDuplicates(nums);

// any modification to nums in your function would be known by the caller.
// using the length returned by your function, it prints the first len elements.
for (int i = 0; i < len; i++) {
    print(nums[i]);
}"¿
```

81. Search in Rotated Sorted Array II https://leetcode.com/problems/search-in-rotated-sorted-array-ii "Suppose an array sorted in ascending order is rotated at some pivot unknown to you beforehand.

(i.e., [0,0,1,2,2,5,6] might become [2,5,6,0,0,1,2]).

You are given a target value to search. If found in the array return true, otherwise return false.

Example 1:

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

Example 2:

Input: nums = [2,5,6,0,0,1,2], target = 3
Output: false

Follow up:

This is a follow up problem to Search in Rotated Sorted Array, where nums may contain duplicates.
Would this affect the run-time complexity? How and why?"¿

82. Remove Duplicates from Sorted List II https://leetcode.com/problems/remove-duplicates-from-sorted-list-ii "Given a sorted linked list, delete all nodes that have duplicate numbers, leaving only distinct numbers from the original list.

Example 1:

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

Example 2:

```
Input: 1->1->1->2->3
Output: 2->3"¿
83. Remove Duplicates from Sorted List  https://leetcode.com/problems/remove-duplica
tes-from-sorted-list    "Given a sorted linked list, delete all duplicates such that
 each element appear only once.

Example 1:

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


Example 2:

Input: 1->1->2->3->3
Output: 1->2->3"¿
84. Largest Rectangle in Histogram  https://leetcode.com/problems/largest-rectangle-
in-histogram    "Given n non-negative integers representing the histogram's bar heig
ht where the width of each bar is 1, find the area of largest rectangle in the histo
gram.



Above is a histogram where width of each bar is 1, given height = [2,1,5,6,2,3].




The largest rectangle is shown in the shaded area, which has area = 10 unit.



Example:

Input: [2,1,5,6,2,3]
Output: 10"¿
85. Maximal Rectangle   https://leetcode.com/problems/maximal-rectangle "Given a 2D
binary matrix filled with 0's and 1's, find the largest rectangle containing only 1'
s and return its area.

Example:

Input:
[
  [""1"",""0"",""1"",""0"",""0""],
  [""1"",""0"",""1"",""1"",""1""],
  [""1"",""1"",""1"",""1"",""1""],
  [""1"",""0"",""0"",""1"",""0""]
]
Output: 6"¿
86. Partition List  https://leetcode.com/problems/partition-list    "Given a linked
list and a value x, partition it such that all nodes less than x come before nodes g
reater than or equal to x.

You should preserve the original relative order of the nodes in each of the two part
itions.

Example:

Input: head = 1->4->3->2->5->2, x = 3
Output: 1->2->2->4->3->5"¿
87. Scramble String https://leetcode.com/problems/scramble-string   "Given a string
s1, we may represent it as a binary tree by partitioning it to two non-empty substri
ngs recursively.

Below is one possible representation of s1 = ""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 s
crambled 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 produ
ces 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 s1 and s2 of the same length, determine if s2 is a scrambled strin
g of s1.

Example 1:

Input: s1 = ""great"", s2 = ""rgeat""
Output: true

Example 2:

Input: s1 = ""abcde"", s2 = ""caebd""
Output: false"¿
88. Merge Sorted Array https://leetcode.com/problems/merge-sorted-array "Given t
wo sorted integer arrays nums1 and nums2, merge nums2 into nums1 as one sorted array
.

Note:

    The number of elements initialized in nums1 and nums2 are m and n respectively.
    You may assume that nums1 has enough space (size that is greater or equal to m +
 n) to hold additional elements from nums2.

Example:

Input:
nums1 = [1,2,3,0,0,0], m = 3
nums2 = [2,5,6],   n = 3

Output: [1,2,2,3,5,6]"¿
89. Gray Code https://leetcode.com/problems/gray-code "The gray code is a binary n
umeral system where two successive values differ in only one bit.

Given a non-negative integer n representing the total number of bits in the code, pr
int the sequence of gray code. A gray code sequence must begin with 0.

For example, given n = 2, return [0,1,3,2]. Its gray code sequence is:

00 - 0
01 - 1
11 - 3
10 - 2

Note:

For a given n, a gray code sequence is not uniquely defined.

For example, [0,2,3,1] is also a valid gray code sequence according to the above def
inition.

For now, the judge is able to judge based on one instance of gray code sequence. Sor
ry about that."¿
90. Subsets II https://leetcode.com/problems/subsets-ii   "Given a collection of i
ntegers that might contain duplicates, nums, return all possible subsets (the power
set).

Note: The solution set must not contain duplicate subsets.

Example:

Input: [1,2,2]
Output:
[
  [2],
  [1],
  [1,2,2],
  [2,2],
  [1,2],
  []
]"¿
91. Decode Ways https://leetcode.com/problems/decode-ways   "A message containing le
tters from A-Z is being encoded to numbers using the following mapping:

'A' -> 1
'B' -> 2
...
'Z' -> 26

Given a non-empty string containing only digits, determine the total number of ways
to decode it.

Example 1:

Input: ""12""
Output: 2
Explanation: It could be decoded as ""AB"" (1 2) or ""L"" (12).

Example 2:

Input: ""226""
Output: 3
Explanation: It could be decoded as ""BZ"" (2 26), ""VF"" (22 6), or ""BBF"" (2 2 6)
."¿
92. Reverse Linked List II https://leetcode.com/problems/reverse-linked-list-ii
"Reverse a linked list from position m to n. Do it in one-pass.

Note: 1 ¿ m ¿ n ¿ length of list.

Example:

Input: 1->2->3->4->5->NULL, m = 2, n = 4
Output: 1->4->3->2->5->NULL"¿
93. Restore IP Addresses   https://leetcode.com/problems/restore-ip-addresses "Giv
en a string containing only digits, restore it by returning all possible valid IP ad
dress combinations.

Example:

Input: ""25525511135""
Output: [""255.255.11.135"", ""255.255.111.35""]"¿
94. Binary Tree Inorder Traversal https://leetcode.com/problems/binary-tree-inorder-traversal "Given a binary tree, return the inorder traversal of its nodes' values.

Example:

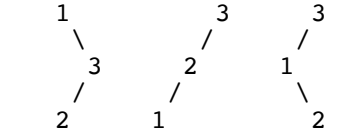
Input: [1,null,2,3]

Output: [1,3,2]

Follow up: Recursive solution is trivial, could you do it iteratively?"¿
95. Unique Binary Search Trees II https://leetcode.com/problems/unique-binary-search-trees-ii "Given an integer n, generate all structurally unique BST's (binary search trees) that store values 1 ... n.

Example:

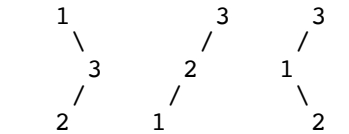
Input: 3
Output:
[
  [1,null,3,2],
  [3,2,null,1],
  [3,1,null,null,2],
  [2,1,3],
  [1,null,2,null,3]
]
Explanation:
The above output corresponds to the 5 unique BST's shown below:



3"¿
96. Unique Binary Search Trees https://leetcode.com/problems/unique-binary-search-trees "Given n, how many structurally unique BST's (binary search trees) that store values 1 ... n?

Example:

Input: 3
Output: 5
Explanation:
Given n = 3, there are a total of 5 unique BST's:



3"¿
97. Interleaving String https://leetcode.com/problems/interleaving-string "Given s1, s2, s3, find whether s3 is formed by the interleaving of s1 and s2.

Example 1:

Input: s1 = ""aabcc"", s2 = ""dbbca"", s3 = ""aadbbcbcac""
Output: true

Example 2:

Input: s1 = ""aabcc"", s2 = ""dbbca"", s3 = ""aadbbbaccc""
Output: false"¿
98. Validate Binary Search Tree https://leetcode.com/problems/validate-binary-search-tree "Given a binary tree, determine if it is a valid binary search tree (BST).

Assume a BST is defined as follows:

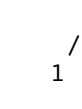
    The left subtree of a node contains only nodes with keys less than the node's ke
y.
    The right subtree of a node contains only nodes with keys greater than the node'
s key.
    Both the left and right subtrees must also be binary search trees.

Example 1:

Input:

Output: true

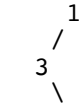
Example 2:


Output: false
Explanation: The input is: [5,1,4,null,null,3,6]. The root node's value
             is 5 but its right child's value is 4."¿
99. Recover Binary Search Tree https://leetcode.com/problems/recover-binary-search-
tree   "Two elements of a binary search tree (BST) are swapped by mistake.

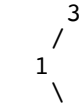
Recover the tree without changing its structure.

Example 1:

Input: [1,3,null,null,2]

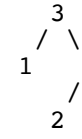


Output: [3,1,null,null,2]

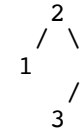


Example 2:

Input: [3,1,4,null,null,2]



Output: [2,1,4,null,null,3]



Follow up:

A solution using O(n) space is pretty straight forward.
Could you devise a constant space solution?"¿
100. Same Tree https://leetcode.com/problems/same-tree "Given two binary trees, wri
te 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.

Example 1:

```
Input:     1         1
          / \       / \
         2   3     2   3

        [1,2,3],   [1,2,3]
```

Output: true

Example 2:

```
Input:     1         1
          /           \
         2             2

        [1,2],     [1,null,2]
```

Output: false

Example 3:

```
Input:     1         1
          / \       / \
         2   1     1   2

        [1,2,1],   [1,1,2]
```

Output: false"¿
101. Symmetric Tree https://leetcode.com/problems/symmetric-tree "Given a binary
tree, check whether it is a mirror of itself (ie, symmetric around its center).

For example, this binary tree [1,2,2,3,4,4,3] is symmetric:

```
    1
   / \
  2   2
 / \ / \
3  4 4  3
```

But the following [1,2,2,null,3,null,3] is not:

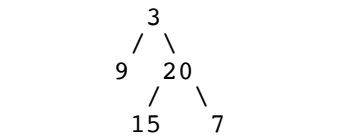
```
    1
   / \
  2   2
   \   \
   3    3
```

Note:

Bonus points if you could solve it both recursively and iteratively."¿
102. Binary Tree Level Order Traversal https://leetcode.com/problems/binary-tree-le
vel-order-traversal "Given a binary tree, return the level order traversal of its no
des' values. (ie, from left to right, level by level).

For example:

Given binary tree [3,9,20,null,null,15,7],

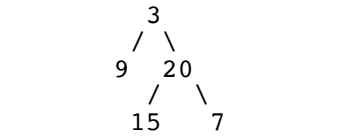


return its level order traversal as:

[
  [3],
  [9,20],
  [15,7]
]"¿
103. Binary Tree Zigzag Level Order Traversal https://leetcode.com/problems/binary-tree-zigzag-level-order-traversal "Given a binary tree, return the zigzag level order traversal of its nodes' values. (ie, from left to right, then right to left for the next level and alternate between).

For example:

Given binary tree [3,9,20,null,null,15,7],



return its zigzag level order traversal as:

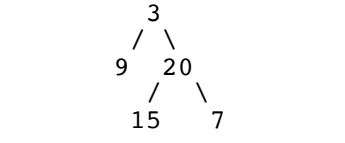
[
  [3],
  [20,9],
  [15,7]
]"¿
104. Maximum Depth of Binary Tree https://leetcode.com/problems/maximum-depth-of-binary-tree "Given a binary tree, find its maximum depth.

The maximum depth is the number of nodes along the longest path from the root node down to the farthest leaf node.

Note: A leaf is a node with no children.

Example:

Given binary tree [3,9,20,null,null,15,7],



return its depth = 3."¿
105. Construct Binary Tree from Preorder and Inorder Traversal https://leetcode.com/problems/construct-binary-tree-from-preorder-and-inorder-traversal "Given preorder and inorder traversal of a tree, construct the binary tree.

Note:

You may assume that duplicates do not exist in the tree.

For example, given

preorder = [3,9,20,15,7]
inorder = [9,3,15,20,7]

Return the following binary tree:

```
    3
   / \
  9  20
    /  \
   15   7"¿
```

106. Construct Binary Tree from Inorder and Postorder Traversal https://leetcode.com/problems/construct-binary-tree-from-inorder-and-postorder-traversal "Given inorder and postorder traversal of a tree, construct the binary tree.

Note:

You may assume that duplicates do not exist in the tree.

For example, given

inorder = [9,3,15,20,7]
postorder = [9,15,7,20,3]

Return the following binary tree:

```
    3
   / \
  9  20
    /  \
   15   7"¿
```

107. Binary Tree Level Order Traversal II https://leetcode.com/problems/binary-tree-level-order-traversal-ii "Given a binary tree, return the bottom-up level order traversal of its nodes' values. (ie, from left to right, level by level from leaf to root).

For example:

Given binary tree [3,9,20,null,null,15,7],

```
    3
   / \
  9  20
    /  \
   15   7
```

return its bottom-up level order traversal as:

```
[
  [15,7],
  [9,20],
  [3]
]"¿
```

108. Convert Sorted Array to Binary Search Tree https://leetcode.com/problems/convert-sorted-array-to-binary-search-tree "Given an array where elements are sorted in ascending order, convert it to a height balanced BST.

For this problem, 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.

Example:

Given the sorted array: [-10,-3,0,5,9],

One possible answer is: [0,-3,9,-10,null,5], which represents the following height balanced BST:

```
      0
     / \
   -3   9
   /   /
```

 -10 5"¿
109. Convert Sorted List to Binary Search Tree https://leetcode.com/problems/convert-sorted-list-to-binary-search-tree "Given a singly linked list where elements are sorted in ascending order, convert it to a height balanced BST.

For this problem, 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.

Example:

Given the sorted linked list: [-10,-3,0,5,9],

One possible answer is: [0,-3,9,-10,null,5], which represents the following height balanced BST:

```
      0
     / \
   -3   9
   /   /
 -10  5"¿
```

110. Balanced Binary Tree   https://leetcode.com/problems/balanced-binary-tree "Given a binary tree, determine if it is height-balanced.

For this problem, 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.

Example 1:

Given the following tree [3,9,20,null,null,15,7]:

```
    3
   / \
  9  20
    /  \
   15   7
```

Return true.

Example 2:

Given the following tree [1,2,2,3,3,null,null,4,4]:

```
       1
      / \
     2   2
    / \
   3   3
  / \
 4   4
```

Return false."¿
111. Minimum Depth of Binary Tree   https://leetcode.com/problems/minimum-depth-of-binary-tree "Given a binary tree, find its minimum depth.

The minimum depth is the number of nodes along the shortest path from the root node down to the nearest leaf node.

Note: A leaf is a node with no children.

Example:

Given binary tree [3,9,20,null,null,15,7],

```
    3
   / \
  9  20
```

```
    /  \
   15   7
```

return its minimum depth = 2."¿
112. Path Sum https://leetcode.com/problems/path-sum "Given a binary tree and a sum, determine if the tree has a root-to-leaf path such that adding up all the values along the path equals the given sum.

Note: A leaf is a node with no children.

Example:

Given the below binary tree and sum = 22,

```
      5
     / \
    4   8
   /   / \
  11  13  4
 /  \      \
7    2      1
```

return true, as there exist a root-to-leaf path 5->4->11->2 which sum is 22."¿
113. Path Sum II https://leetcode.com/problems/path-sum-ii "Given a binary tree and a sum, find all root-to-leaf paths where each path's sum equals the given sum.

Note: A leaf is a node with no children.

Example:

Given the below binary tree and sum = 22,

```
      5
     / \
    4   8
   /   / \
  11  13  4
 /  \    / \
7    2  5   1
```

Return:

```
[
   [5,4,11,2],
   [5,8,4,5]
]"¿
```
114. Flatten Binary Tree to Linked List https://leetcode.com/problems/flatten-binary-tree-to-linked-list "Given a binary tree, flatten it to a linked list in-place.

For example, given the following tree:

```
    1
   / \
  2   5
 / \   \
3   4   6
```

The flattened tree should look like:

```
1
 \
  2
   \
    3
     \
      4
       \
        5
         \
          6"¿
```

115. Distinct Subsequences https://leetcode.com/problems/distinct-subsequences "Given a string S and a string T, count the number of distinct subsequences of S which equals T.

A subsequence of a string is a new string which is formed from the original string by deleting some (can be none) of the characters without disturbing the relative positions of the remaining characters. (ie, ""ACE"" is a subsequence of ""ABCDE"" while ""AEC"" is not).

Example 1:

Input: S = ""rabbbit"", T = ""rabbit""
Output: 3
Explanation:

As shown below, there are 3 ways you can generate ""rabbit"" from S.
(The caret symbol ^ means the chosen letters)

rabbbit
^^^^ ^^
rabbbit
^^ ^^^^
rabbbit
^^^ ^^^

Example 2:

Input: S = ""babgbag"", T = ""bag""
Output: 5
Explanation:

As shown below, there are 5 ways you can generate ""bag"" from S.
(The caret symbol ^ means the chosen letters)

babgbag
^^ ^
babgbag
^^ ^
babgbag
^ ^^
babgbag
  ^ ^^
babgbag
    ^^^"¿
116. Populating Next Right Pointers in Each Node https://leetcode.com/problems/populating-next-right-pointers-in-each-node "Given a binary tree

```
struct TreeLinkNode {
  TreeLinkNode *left;
  TreeLinkNode *right;
  TreeLinkNode *next;
}
```

Populate each next pointer to point to its next right node. If there is no next right node, the next pointer should be set to NULL.

Initially, all next pointers are set to NULL.

Note:

    You may only use constant extra space.
    Recursive approach is fine, implicit stack space does not count as extra space for this problem.
    You may assume that it is a perfect binary tree (ie, all leaves are at the same level, and every parent has two children).

Example:

Given the following perfect binary tree,

```
     1
   /  \
  2    3
 / \  / \
4  5  6  7
```

After calling your function, the tree should look like:

```
     1 -> NULL
   /  \
  2 -> 3 -> NULL
 / \  / \
4->5->6->7 -> NULL"¿
```

117. Populating Next Right Pointers in Each Node II https://leetcode.com/problems/populating-next-right-pointers-in-each-node-ii "Given a binary tree

```
struct TreeLinkNode {
  TreeLinkNode *left;
  TreeLinkNode *right;
  TreeLinkNode *next;
}
```

Populate each next pointer to point to its next right node. If there is no next right node, the next pointer should be set to NULL.

Initially, all next pointers are set to NULL.

Note:

    You may only use constant extra space.
    Recursive approach is fine, implicit stack space does not count as extra space for this problem.

Example:

Given the following binary tree,

```
     1
   /  \
  2    3
 / \    \
4   5    7
```

After calling your function, the tree should look like:

```
     1 -> NULL
   /  \
  2 -> 3 -> NULL
 / \    \
4-> 5 -> 7 -> NULL"¿
```

118. Pascal's Triangle https://leetcode.com/problems/pascals-triangle "Given a non-negative integer numRows, generate the first numRows of Pascal's triangle.

In Pascal's triangle, each number is the sum of the two numbers directly above it.

Example:

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

]"¿
119. Pascal's Triangle II https://leetcode.com/problems/pascals-triangle-ii "Given a non-negative index k where k ¿ 33, return the kth index row of the Pascal's triangle.

Note that the row index starts from 0.

In Pascal's triangle, each number is the sum of the two numbers directly above it.

Example:

Input: 3
Output: [1,3,3,1]

Follow up:

Could you optimize your algorithm to use only O(k) extra space?"¿
120. Triangle https://leetcode.com/problems/triangle "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).

Note:

Bonus point if you are able to do this using only O(n) extra space, where n is the total number of rows in the triangle."¿
121. Best Time to Buy and Sell Stock https://leetcode.com/problems/best-time-to-buy-and-sell-stock "Say you have an array for which the ith 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.

Note that you cannot sell a stock before you buy one.

Example 1:

Input: [7,1,5,3,6,4]
Output: 5
Explanation: Buy on day 2 (price = 1) and sell on day 5 (price = 6), profit = 6-1 = 5.
Not 7-1 = 6, as selling price needs to be larger than buying price.

Example 2:

Input: [7,6,4,3,1]
Output: 0
Explanation: In this case, no transaction is done, i.e. max profit = 0."¿
122. Best Time to Buy and Sell Stock II https://leetcode.com/problems/best-time-to-buy-and-sell-stock-ii "Say you have an array 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).

Note: You may not engage in multiple transactions at the same time (i.e., you must sell the stock before you buy again).

Example 1:

Input: [7,1,5,3,6,4]
Output: 7
Explanation: Buy on day 2 (price = 1) and sell on day 3 (price = 5), profit = 5-1 = 4.
Then buy on day 4 (price = 3) and sell on day 5 (price = 6), profit = 6-3 = 3.

Example 2:

Input: [1,2,3,4,5]
Output: 4
Explanation: Buy on day 1 (price = 1) and sell on day 5 (price = 5), profit = 5-1 = 4.
Note that you cannot buy on day 1, buy on day 2 and sell them later, as you are
engaging multiple transactions at the same time. You must sell before buying again.

Example 3:

Input: [7,6,4,3,1]
Output: 0
Explanation: In this case, no transaction is done, i.e. max profit = 0."¿
123. Best Time to Buy and Sell Stock III https://leetcode.com/problems/best-time-to-buy-and-sell-stock-iii "Say you have an array 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 two transactions.

Note: You may not engage in multiple transactions at the same time (i.e., you must sell the stock before you buy again).

Example 1:

Input: [3,3,5,0,0,3,1,4]
Output: 6
Explanation: Buy on day 4 (price = 0) and sell on day 6 (price = 3), profit = 3-0 = 3.
Then buy on day 7 (price = 1) and sell on day 8 (price = 4), profit = 4-1 = 3.

Example 2:

Input: [1,2,3,4,5]
Output: 4
Explanation: Buy on day 1 (price = 1) and sell on day 5 (price = 5), profit = 5-1 = 4.
Note that you cannot buy on day 1, buy on day 2 and sell them later, as you are
engaging multiple transactions at the same time. You must sell before buying again.

Example 3:

Input: [7,6,4,3,1]
Output: 0
Explanation: In this case, no transaction is done, i.e. max profit = 0."¿
124. Binary Tree Maximum Path Sum https://leetcode.com/problems/binary-tree-maximum-path-sum "Given a non-empty binary tree, find the maximum path sum.

For this problem, a path is defined as any sequence of nodes from some starting node to any node in the tree along the parent-child connections. The path must contain at least one node and does not need to go through the root.

Example 1:

Input: [1,2,3]

```
       1
      / \
     2   3
```

Output: 6

Example 2:

Input: [-10,9,20,null,null,15,7]

```
   -10
   / \
  9  20
    /  \
   15   7
```

Output: 42"¿
125. Valid Palindrome https://leetcode.com/problems/valid-palindrome "Given a str ing, determine if it is a palindrome, considering only alphanumeric characters and i gnoring cases.

Note: For the purpose of this problem, we define empty string as valid palindrome.

Example 1:

Input: ""A man, a plan, a canal: Panama""
Output: true

Example 2:

Input: ""race a car""
Output: false"¿
126. Word Ladder II https://leetcode.com/problems/word-ladder-ii "Given two words (beginWord and endWord), and a dictionary's word list, find all shortest transforma tion sequence(s) from beginWord to endWord, such that:

Only one letter can be changed at a time
Each transformed word must exist in the word list. Note that beginWord is not a transformed word.

Note:

Return an empty list if there is no such transformation sequence.
All words have the same length.
All words contain only lowercase alphabetic characters.
You may assume no duplicates in the word list.
You may assume beginWord and endWord are non-empty and are not the same.

Example 1:

Input:
beginWord = ""hit"",
endWord = ""cog"",
wordList = [""hot"",""dot"",""dog"",""lot"",""log"",""cog""]

Output:
[
  [""hit"",""hot"",""dot"",""dog"",""cog""],
  [""hit"",""hot"",""lot"",""log"",""cog""]
]

Example 2:

Input:
beginWord = ""hit""

endWord = ""cog""
wordList = [""hot"",""dot"",""dog"",""lot"",""log""]

Output: []

Explanation: The endWord ""cog"" is not in wordList, therefore no possible transform
ation."¿
127. Word Ladder https://leetcode.com/problems/word-ladder "Given two words (be
ginWord and endWord), and a dictionary's word list, find the length of shortest tran
sformation sequence from beginWord to endWord, such that:

Only one letter can be changed at a time.
Each transformed word must exist in the word list. Note that beginWord is not a
transformed word.

Note:

Return 0 if there is no such transformation sequence.
All words have the same length.
All words contain only lowercase alphabetic characters.
You may assume no duplicates in the word list.
You may assume beginWord and endWord are non-empty and are not the same.

Example 1:

Input:
beginWord = ""hit"",
endWord = ""cog"",
wordList = [""hot"",""dot"",""dog"",""lot"",""log"",""cog""]

Output: 5

Explanation: As one shortest transformation is ""hit"" -> ""hot"" -> ""dot"" -> ""do
g"" -> ""cog"",
return its length 5.

Example 2:

Input:
beginWord = ""hit""
endWord = ""cog""
wordList = [""hot"",""dot"",""dog"",""lot"",""log""]

Output: 0

Explanation: The endWord ""cog"" is not in wordList, therefore no possible transform
ation."¿
128. Longest Consecutive Sequence https://leetcode.com/problems/longest-consecutiv
e-sequence "Given an unsorted array of integers, find the length of the longest con
secutive elements sequence.

Your algorithm should run in O(n) complexity.

Example:

Input: [100, 4, 200, 1, 3, 2]
Output: 4
Explanation: The longest consecutive elements sequence is [1, 2, 3, 4]. Therefore it
s length is 4."¿
129. Sum Root to Leaf Numbers https://leetcode.com/problems/sum-root-to-leaf-numbe
rs "Given a binary tree containing digits from 0-9 only, each root-to-leaf path cou
ld represent a number.

An example is the root-to-leaf path 1->2->3 which represents the number 123.

Find the total sum of all root-to-leaf numbers.

Note: A leaf is a node with no children.

Example:

Input: [1,2,3]
```
    1
   / \
  2   3
```
Output: 25
Explanation:
The root-to-leaf path 1->2 represents the number 12.
The root-to-leaf path 1->3 represents the number 13.
Therefore, sum = 12 + 13 = 25.

Example 2:

Input: [4,9,0,5,1]
```
    4
   / \
  9   0
 / \
5   1
```
Output: 1026
Explanation:
The root-to-leaf path 4->9->5 represents the number 495.
The root-to-leaf path 4->9->1 represents the number 491.
The root-to-leaf path 4->0 represents the number 40.
Therefore, sum = 495 + 491 + 40 = 1026."¿
130. Surrounded Regions https://leetcode.com/problems/surrounded-regions "Given a 2D board containing 'X' and 'O' (the letter O), capture all regions surrounded by 'X'.

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

Example:

```
X X X X
X O O X
X X O X
X O X X
```

After running your function, the board should be:

```
X X X X
X X X X
X X X X
X O X X
```

Explanation:

Surrounded regions shouldn¿t be on the border, which means that any 'O' on the border of the board are not flipped to 'X'. Any 'O' that is not on the border and it is not connected to an 'O' on the border will be flipped to 'X'. Two cells are connected if they are adjacent cells connected horizontally or vertically."¿
131. Palindrome Partitioning https://leetcode.com/problems/palindrome-partitioning "Given a string s, partition s such that every substring of the partition is a palindrome.

Return all possible palindrome partitioning of s.

Example:

Input: ""aab""
Output:
```
[
  [""aa"",""b""],
  [""a"",""a"",""b""]
]"¿
```
132. Palindrome Partitioning II https://leetcode.com/problems/palindrome-partitioning-ii "Given a string s, partition s such that every substring of the partition is a palindrome.

Return the minimum cuts needed for a palindrome partitioning of s.

Example:

Input: ""aab""
Output: 1
Explanation: The palindrome partitioning [""aa"",""b""] could be produced using 1 cu
t."¿
133. Clone Graph https://leetcode.com/problems/clone-graph "OJ's undirected gra
ph serialization:

Nodes are labeled uniquely.

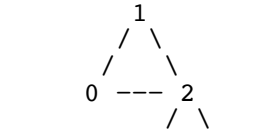
We use # as a separator for each node, and , as a separator for node label and each
neighbor of the node.

As an example, consider the serialized graph {0,1,2#1,2#2,2}.

The graph has a total of three nodes, and therefore contains three parts as separate
d by #.

First node is labeled as 0. Connect node 0 to both nodes 1 and 2.
Second node is labeled as 1. Connect node 1 to node 2.
Third node is labeled as 2. Connect node 2 to node 2 (itself), thus forming a self-c
ycle.

Visually, the graph looks like the following:



133. Clone Graph https://leetcode.com/problems/clone-graph "Clone an undirected
graph. Each node in the graph contains a label and a list of its neighbors.

OJ's undirected graph serialization:

Nodes are labeled uniquely.

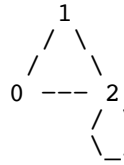
We use # as a separator for each node, and , as a separator for node label and each
neighbor of the node.

As an example, consider the serialized graph {0,1,2#1,2#2,2}.

The graph has a total of three nodes, and therefore contains three parts as separate
d by #.

First node is labeled as 0. Connect node 0 to both nodes 1 and 2.
Second node is labeled as 1. Connect node 1 to node 2.
Third node is labeled as 2. Connect node 2 to node 2 (itself), thus forming a self-c
ycle.

Visually, the graph looks like the following:



134. Gas Station https://leetcode.com/problems/gas-station "There are N gas stations along a circular route, where the amount of gas at station i is gas[i].

You have a car with an unlimited gas tank and it costs cost[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 starting gas station's index if you can travel around the circuit once in the clockwise direction, otherwise return -1.

Note:

- If there exists a solution, it is guaranteed to be unique.
- Both input arrays are non-empty and have the same length.
- Each element in the input arrays is a non-negative integer.

Example 1:

Input:
gas = [1,2,3,4,5]
cost = [3,4,5,1,2]

Output: 3

Explanation:
Start at station 3 (index 3) and fill up with 4 unit of gas. Your tank = 0 + 4 = 4
Travel to station 4. Your tank = 4 - 1 + 5 = 8
Travel to station 0. Your tank = 8 - 2 + 1 = 7
Travel to station 1. Your tank = 7 - 3 + 2 = 6
Travel to station 2. Your tank = 6 - 4 + 3 = 5
Travel to station 3. The cost is 5. Your gas is just enough to travel back to station 3.
Therefore, return 3 as the starting index.

Example 2:

Input:
gas = [2,3,4]
cost = [3,4,3]

Output: -1

Explanation:
You can't start at station 0 or 1, as there is not enough gas to travel to the next station.
Let's start at station 2 and fill up with 4 unit of gas. Your tank = 0 + 4 = 4
Travel to station 0. Your tank = 4 - 3 + 2 = 3
Travel to station 1. Your tank = 3 - 3 + 3 = 3
You cannot travel back to station 2, as it requires 4 unit of gas but you only have 3.
Therefore, you can't travel around the circuit once no matter where you start."¿
135. Candy https://leetcode.com/problems/candy "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:

- Each child must have at least one candy.
- Children with a higher rating get more candies than their neighbors.

What is the minimum candies you must give?

Example 1:

Input: [1,0,2]
Output: 5
Explanation: You can allocate to the first, second and third child with 2, 1, 2 cand
ies respectively.

Example 2:

Input: [1,2,2]
Output: 4
Explanation: You can allocate to the first, second and third child with 1, 2, 1 cand
ies respectively.
The third child gets 1 candy because it satisfies the above two conditi
ons."¿
136. Single Number https://leetcode.com/problems/single-number "Given a non-empty a
rray of integers, every element appears twice except for one. Find that single one.

Note:

Your algorithm should have a linear runtime complexity. Could you implement it witho
ut using extra memory?

Example 1:

Input: [2,2,1]
Output: 1

Example 2:

Input: [4,1,2,1,2]
Output: 4"¿
137. Single Number II https://leetcode.com/problems/single-number-ii "Given a non
-empty array of integers, every element appears three times except for one, which ap
pears exactly once. Find that single one.

Note:

Your algorithm should have a linear runtime complexity. Could you implement it witho
ut using extra memory?

Example 1:

Input: [2,2,3,2]
Output: 3

Example 2:

Input: [0,1,0,1,0,1,99]
Output: 99"¿
138. Copy List with Random Pointer https://leetcode.com/problems/copy-list-with-ran
dom-pointer "A linked list is given such that each node contains an additional rando
m pointer which could point to any node in the list or null.

Return a deep copy of the list."¿
139. Word Break https://leetcode.com/problems/word-break "Given a non-empty strin
g s and a dictionary wordDict containing a list of non-empty words, determine if s c
an be segmented into a space-separated sequence of one or more dictionary words.

Note:

The same word in the dictionary may be reused multiple times in the segmentation
.

    You may assume the dictionary does not contain duplicate words.

Example 1:

Input: s = ""leetcode"", wordDict = [""leet"", ""code""]
Output: true
Explanation: Return true because ""leetcode"" can be segmented as ""leet code"".

Example 2:

Input: s = ""applepenapple"", wordDict = [""apple"", ""pen""]
Output: true
Explanation: Return true because ""applepenapple"" can be segmented as ""apple pen a
pple"".
             Note that you are allowed to reuse a dictionary word.

Example 3:

Input: s = ""catsandog"", wordDict = [""cats"", ""dog"", ""sand"", ""and"", ""cat""]
Output: false"¿
140. Word Break II https://leetcode.com/problems/word-break-ii "Given a non-empty s
tring s and a dictionary wordDict containing a list of non-empty words, add spaces i
n s to construct a sentence where each word is a valid dictionary word. Return all s
uch possible sentences.

Note:

    The same word in the dictionary may be reused multiple times in the segmentation
.
    You may assume the dictionary does not contain duplicate words.

Example 1:

Input:
s = ""catsanddog""
wordDict = [""cat"", ""cats"", ""and"", ""sand"", ""dog""]
Output:
[
  ""cats and dog"",
  ""cat sand dog""
]

Example 2:

Input:
s = ""pineapplepenapple""
wordDict = [""apple"", ""pen"", ""applepen"", ""pine"", ""pineapple""]
Output:
[
  ""pine apple pen apple"",
  ""pineapple pen apple"",
  ""pine applepen apple""
]
Explanation: Note that you are allowed to reuse a dictionary word.

Example 3:

Input:
s = ""catsandog""
wordDict = [""cats"", ""dog"", ""sand"", ""and"", ""cat""]
Output:
[]"¿
141. Linked List Cycle https://leetcode.com/problems/linked-list-cycle "Given a lin
ked list, determine if it has a cycle in it.

Follow up:

Can you solve it without using extra space?"¿
142. Linked List Cycle II https://leetcode.com/problems/linked-list-cycle-ii "Given a linked list, return the node where the cycle begins. If there is no cycle, return null.

Note: Do not modify the linked list.

Follow up:

Can you solve it without using extra space?"¿
143. Reorder List https://leetcode.com/problems/reorder-list "Given a singly linked list L: L0¿L1¿¿¿Ln-1¿Ln,

reorder it to: L0¿Ln¿L1¿Ln-1¿L2¿Ln-2¿¿

You may not modify the values in the list's nodes, only nodes itself may be changed.

Example 1:

Given 1->2->3->4, reorder it to 1->4->2->3.

Example 2:

Given 1->2->3->4->5, reorder it to 1->5->2->4->3."¿
144. Binary Tree Preorder Traversal https://leetcode.com/problems/binary-tree-preorder-traversal "Given a binary tree, return the preorder traversal of its nodes' values.

Example:

Input: [1,null,2,3]

Output: [1,2,3]

Follow up: Recursive solution is trivial, could you do it iteratively?"¿
145. Binary Tree Postorder Traversal https://leetcode.com/problems/binary-tree-postorder-traversal "Given a binary tree, return the postorder traversal of its nodes' values.

Example:

Input: [1,null,2,3]

Output: [3,2,1]

Follow up: Recursive solution is trivial, could you do it iteratively?"¿
146. LRU Cache https://leetcode.com/problems/lru-cache "Design and implement a data structure for Least Recently Used (LRU) cache. It should support the following operations: get and put.

get(key) - Get the value (will always be positive) of the key if the key exists in the cache, otherwise return -1.

put(key, value) - Set or insert the value if the key is not already present. When th
e cache reached its capacity, it should invalidate the least recently used item befo
re inserting a new item.

Follow up:

Could you do both operations in O(1) time complexity?

Example:
LRUCache cache = new LRUCache(2 /* capacity */);

```
cache.put(1, 1);
cache.put(2, 2);
cache.get(1);       // returns 1
cache.put(3, 3);    // evicts key 2
cache.get(2);       // returns -1 (not found)
cache.put(4, 4);    // evicts key 1
cache.get(1);       // returns -1 (not found)
cache.get(3);       // returns 3
cache.get(4);       // returns 4"¿
```

147. Insertion Sort List https://leetcode.com/problems/insertion-sort-list "Sor
t a linked list using insertion sort.

A graphical example of insertion sort. The partial sorted list (black) initially con
tains only the first element in the list.

With each iteration one element (red) is removed from the input data and inserted in
-place into the sorted list

Algorithm of Insertion Sort:

Insertion sort iterates, consuming one input element each repetition, and growin
g a sorted output list.
At each iteration, insertion sort removes one element from the input data, finds
the location it belongs within the sorted list, and inserts it there.
It repeats until no input elements remain.

Example 1:

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

Example 2:

Input: -1->5->3->4->0
Output: -1->0->3->4->5"¿
148. Sort List https://leetcode.com/problems/sort-list "Sort a linked list in O(n l
og n) time using constant space complexity.

Example 1:

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

Example 2:

```
Input: -1->5->3->4->0
Output: -1->0->3->4->5"¿
149. Max Points on a Line   https://leetcode.com/problems/max-points-on-a-line  "Giv
en n points on a 2D plane, find the maximum number of points that lie on the same st
raight line.

Example 1:

Input: [[1,1],[2,2],[3,3]]
Output: 3
Explanation:
^
|
|        o
|     o
|  o
+------------->
0  1  2  3  4


Example 2:

Input: [[1,1],[3,2],[5,3],[4,1],[2,3],[1,4]]
Output: 4
Explanation:
^
|
|  o
|     o        o
|        o
|  o        o
+------------------->
0  1  2  3  4  5  6"¿
150. Evaluate Reverse Polish Notation   https://leetcode.com/problems/evaluate-rever
se-polish-notation  "Evaluate the value of an arithmetic expression in Reverse Polis
h Notation.

Valid operators are +, -, *, /. Each operand may be an integer or another expression
.

Note:


    Division between two integers should truncate toward zero.
    The given RPN expression is always valid. That means the expression would always
 evaluate to a result and there won't be any divide by zero operation.


Example 1:

Input: [""2"", ""1"", ""+"", ""3"", ""*""]
Output: 9
Explanation: ((2 + 1) * 3) = 9


Example 2:

Input: [""4"", ""13"", ""5"", ""/"", ""+""]
Output: 6
Explanation: (4 + (13 / 5)) = 6


Example 3:

Input: [""10"", ""6"", ""9"", ""3"", ""+"", ""-11"", ""*"", ""/"", ""*"", ""17"", ""
+"", ""5"", ""+""]
Output: 22
Explanation:
  ((10 * (6 / ((9 + 3) * -11))) + 17) + 5
= ((10 * (6 / (12 * -11))) + 17) + 5
= ((10 * (6 / -132)) + 17) + 5
= ((10 * 0) + 17) + 5
= (0 + 17) + 5
```

= 17 + 5
= 22"¿
151. Reverse Words in a String https://leetcode.com/problems/reverse-words-in-a-str
ing "Given an input string, reverse the string word by word.

Example:

Input: ""the sky is blue"",
Output: ""blue is sky the"".

Notes:

    A word is defined as a sequence of non-space characters.
    Input string may contain leading or trailing spaces. However, your reversed stri
ng should not contain leading or trailing spaces.
    You need to reduce multiple spaces between two words to a single space in the re
versed string.

Follow up: For C programmers, try to solve it in-place in O(1) space."¿
152. Maximum Product Subarray https://leetcode.com/problems/maximum-product-subarr
ay "Given an integer array nums, find the contiguous subarray within an array (cont
aining at least one number) which has the largest product.

Example 1:

Input: [2,3,-2,4]
Output: 6
Explanation: [2,3] has the largest product = 6.

Example 2:

Input: [-2,0,-1]
Output: 0
Explanation: The result cannot be 2, because [-2,-1] is not a subarray."¿
153. Find Minimum in Rotated Sorted Array https://leetcode.com/problems/find-minim
um-in-rotated-sorted-array "Suppose an array sorted in ascending order is rotated a
t some pivot unknown to you beforehand.

(i.e., [0,1,2,4,5,6,7] might become [4,5,6,7,0,1,2]).

Find the minimum element.

You may assume no duplicate exists in the array.

Example:

Input: [3,4,5,1,2]
Output: 1"¿
154. Find Minimum in Rotated Sorted Array II https://leetcode.com/problems/find-m
inimum-in-rotated-sorted-array-ii "Suppose an array sorted in ascending order is r
otated at some pivot unknown to you beforehand.

(i.e., [0,1,2,4,5,6,7] might become [4,5,6,7,0,1,2]).

Find the minimum element.

The array may contain duplicates.

Example 1:

Input: [1,3,5]
Output: 1

Example 2:

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

Note:

    This is a follow up for ""Find Minimum in Rotated Sorted Array"".
    Would allow duplicates affect the run-time complexity? How and why?"¿
155. Min Stack https://leetcode.com/problems/min-stack "Design a stack that support
s push, pop, top, and retrieving the minimum element in constant time.

push(x) -- Push element x onto stack.

pop() -- Removes the element on top of the stack.

top() -- Get the top element.

getMin() -- Retrieve the minimum element in the stack.

Example:

```
MinStack minStack = new MinStack();
minStack.push(-2);
minStack.push(0);
minStack.push(-3);
minStack.getMin();   --> Returns -3.
minStack.pop();
minStack.top();      --> Returns 0.
minStack.getMin();   --> Returns -2."¿
```

160. Intersection of Two Linked Lists https://leetcode.com/problems/intersection-o
f-two-linked-lists "Write a program to find the node at which the intersection of t
wo singly linked lists begins.

For example, the following two linked lists:

```
A:          a1 ¿ a2
                  ¿
                    c1 ¿ c2 ¿ c3
                  ¿
B:     b1 ¿ b2 ¿ b3
```

begin to intersect at node c1.

Notes:

If the two linked lists have no intersection at all, return null.
The linked lists must retain their original structure after the function returns.
You may assume there are no cycles anywhere in the entire linked structure.
Your code should preferably run in O(n) time and use only O(1) memory.

Credits:
Special thanks to @stellari for adding this problem and creating all test cases."¿
162. Find Peak Element https://leetcode.com/problems/find-peak-element "A peak elem
ent is an element that is greater than its neighbors.

Given an input array nums, where num[i] ¿ num[i+1], find a peak element and return i
ts index.

The array may contain multiple peaks, in that case return the index to any one of th
e peaks is fine.

You may imagine that num[-1] = num[n] = -¿.

Example 1:

```
Input: nums = [1, 2, 3, 1]
Output: 2
```

Explanation: 3 is a peak element and your function should return the index number 2.

Example 2:

Input: nums = [1, 2, 1, 3, 5, 6, 4]
Output: 1 or 5
Explanation: Your function can return either index number 1 where the peak element i
s 2,
             or index number 5 where the peak element is 6.

Note:

Your solution should be in logarithmic complexity.

Credits:

Special thanks to @ts for adding this problem and creating all test cases."¿
162. Find Peak Element https://leetcode.com/problems/find-peak-element "Note:

Your solution should be in logarithmic complexity."¿
164. Maximum Gap   https://leetcode.com/problems/maximum-gap   "Given an unsorted a
rray, find the maximum difference between the successive elements in its sorted form
.

Return 0 if the array contains less than 2 elements.

Example 1:

Input: [3,9,6,1]
Output: 3
Explanation: The sorted form of the array is [1,3,6,9], either 3,6 or 6,9 has the ma
ximum difference 3.

Example 2:

Input: [10]
Output: 0
Explanation: The array contains less than 2 elements, therefore return 0.

Notes:

    You may assume all elements in the array are non-negative integers and fit in th
e 32-bit signed integer range.
    Try to solve it in linear time/space.

Credits:

Special thanks to @porker2008 for adding this problem and creating all test cases."¿
165. Compare Version Numbers   https://leetcode.com/problems/compare-version-number
s   "Compare two version numbers version1 and version2.

If version1 > version2 return 1, if version1 < version2 return -1, otherwise return
0.

You may assume that the version strings are non-empty and contain only digits and th
e . character.

The . character does not represent a decimal point and is used to separate number se
quences.

For instance, 2.5 is not ""two and a half"" or ""half way to version three"", it is
the fifth second-level revision of the second first-level revision.

Here is an example of version numbers ordering:

0.1 < 1.1 < 1.2 < 13.37

Credits:

Special thanks to @ts for adding this problem and creating all test cases."¿
166. Fraction to Recurring Decimal https://leetcode.com/problems/fraction-to-recurring-decimal "Given two integers representing the numerator and denominator of a fraction, return the fraction in string format.

If the fractional part is repeating, enclose the repeating part in parentheses.

Example 1:

Input: numerator = 1, denominator = 2
Output: ""0.5"".

Example 2:

Input: numerator = 2, denominator = 1
Output: ""2"".

Example 3:

Input: numerator = 2, denominator = 3
Output: ""0.(6)"".

Credits:

Special thanks to @Shangrila for adding this problem and creating all test cases."¿
167. Two Sum II - Input array is sorted https://leetcode.com/problems/two-sum-ii-input-array-is-sorted "Given an array of integers that is already sorted in ascending order, find two numbers such that they add up to a specific target number.

The function twoSum should return indices of the two numbers such that they add up to the target, where index1 must be less than index2.

Note:

    Your returned answers (both index1 and index2) are not zero-based.
    You may assume that each input would have exactly one solution and you may not use the same element twice.

Example:

Input: numbers = [2, 7, 11, 15], target = 9
Output: [1,2]
Explanation: The sum of 2 and 7 is 9. Therefore index1 = 1, index2 = 2."¿
168. Excel Sheet Column Title https://leetcode.com/problems/excel-sheet-column-title "Given a positive integer, return its corresponding column title as appear in an Excel sheet.

For example:

    1 -> A
    2 -> B
    3 -> C
    ...
    26 -> Z
    27 -> AA
    28 -> AB
    ...

Example 1:

Input: 1
Output: ""A""

Example 2:

Input: 28
Output: ""AB""

Example 3:

Input: 701
Output: ""ZY""

Credits:

Special thanks to @ifanchu for adding this problem and creating all test cases."¿
169. Majority Element https://leetcode.com/problems/majority-element "Given an ar
ray of size n, find the majority element. The majority element is the element that a
ppears more than ¿ n/2 ¿ times.

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

Example 1:

Input: [3,2,3]
Output: 3

Example 2:

Input: [2,2,1,1,1,2,2]
Output: 2

Credits:

Special thanks to @ts for adding this problem and creating all test cases."¿
171. Excel Sheet Column Number https://leetcode.com/problems/excel-sheet-column-num
ber "Given a column title as appear in an Excel sheet, return its corresponding colu
mn number.

For example:

    A -> 1
    B -> 2
    C -> 3
    ...
    Z -> 26
    AA -> 27
    AB -> 28
    ...

Example 1:

Input: ""A""
Output: 1

Example 2:

Input: ""AB""
Output: 28

Example 3:

Input: ""ZY""
Output: 701

Credits:

Special thanks to @ts for adding this problem and creating all test cases."¿
172. Factorial Trailing Zeroes https://leetcode.com/problems/factorial-trailing-zer
oes "Given an integer n, return the number of trailing zeroes in n!.

Example 1:

Input: 3
Output: 0
Explanation: 3! = 6, no trailing zero.

Example 2:

Input: 5
Output: 1
Explanation: 5! = 120, one trailing zero.

Note: Your solution should be in logarithmic time complexity.

Credits:

Special thanks to @ts for adding this problem and creating all test cases."¿
173. Binary Search Tree Iterator https://leetcode.com/problems/binary-search-tree-iterator "Implement an iterator over a binary search tree (BST). Your iterator will be initialized with the root node of a BST.

Calling next() will return the next smallest number in the BST.

Note: next() and hasNext() should run in average O(1) time and uses O(h) memory, where h is the height of the tree.

Credits:
Special thanks to @ts for adding this problem and creating all test cases."¿
174. Dungeon Game https://leetcode.com/problems/dungeon-game "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.

-2 (K)
-3
3

-5
-10
1

10
30
-5 (P)

Notes:

The knight's health has no upper bound.

Any room can contain threats or power-ups, even the first room the knight enters and the bottom-right room where the princess is imprisoned.

Credits:

Special thanks to @stellari for adding this problem and creating all test cases."¿
175. Combine Two Tables https://leetcode.com/problems/combine-two-tables "Table: Person

Column Name	Type
PersonId	int
FirstName	varchar
LastName	varchar

PersonId is the primary key column for this table.

Table: Address

Column Name	Type
AddressId	int
PersonId	int
City	varchar
State	varchar

AddressId is the primary key column for this table.

Write a SQL query for a report that provides the following information for each pers on in the Person table, regardless if there is an address for each of those people:

FirstName, LastName, City, State"¿
176. Second Highest Salary https://leetcode.com/problems/second-highest-salary "Wri te a SQL query to get the second highest salary from the Employee table.

Id	Salary
1	100
2	200
3	300

For example, given the above Employee table, the query should return 200 as the seco nd highest salary. If there is no second highest salary, then the query should retur n null.

SecondHighestSalary
200

"¿
177. Nth Highest Salary https://leetcode.com/problems/nth-highest-salary "Write a SQL query to get the nth highest salary from the Employee table.

Id	Salary
1	100
2	200
3	300

```
+----+--------+
```

For example, given the above Employee table, the nth highest salary where n = 2 is 2
00. If there is no nth highest salary, then the query should return null.

```
+------------------------+
| getNthHighestSalary(2) |
+------------------------+
| 200                    |
+------------------------+"¿
```

178. Rank Scores https://leetcode.com/problems/rank-scores "Write a SQL query t
o rank scores. If there is a tie between two scores, both should have the same ranki
ng. Note that after a tie, the next ranking number should be the next consecutive in
teger value. In other words, there should be no ""holes"" between ranks.

```
+----+-------+
| Id | Score |
+----+-------+
| 1  | 3.50  |
| 2  | 3.65  |
| 3  | 4.00  |
| 4  | 3.85  |
| 5  | 4.00  |
| 6  | 3.65  |
+----+-------+
```

For example, given the above Scores table, your query should generate the following
report (order by highest score):

```
+-------+------+
| Score | Rank |
+-------+------+
| 4.00  | 1    |
| 4.00  | 1    |
| 3.85  | 2    |
| 3.65  | 3    |
| 3.65  | 3    |
| 3.50  | 4    |
+-------+------+"¿
```

179. Largest Number https://leetcode.com/problems/largest-number "Given a list of
non negative integers, arrange them such that they form the largest number.

Example 1:

```
Input: [10,2]
Output: 210
```

Example 2:

```
Input: [3,30,34,5,9]
Output: 9534330
```

Note: The result may be very large, so you need to return a string instead of an int
eger.

Credits:

Special thanks to @ts for adding this problem and creating all test cases."¿
180. Consecutive Numbers https://leetcode.com/problems/consecutive-numbers "Wri
te a SQL query to find all numbers that appear at least three times consecutively.

```
+----+-----+
| Id | Num |
+----+-----+
| 1  |  1  |
| 2  |  1  |
| 3  |  1  |
| 4  |  2  |
| 5  |  1  |
| 6  |  2  |
```

```
| 7   |  2  |
+----+-----+
```

For example, given the above Logs table, 1 is the only number that appears consecuti
vely for at least three times.

```
+-----------------+
| ConsecutiveNums |
+-----------------+
| 1               |
+-----------------+"¿
```

181. Employees Earning More Than Their Managers https://leetcode.com/problems/employ
ees-earning-more-than-their-managers "The Employee table holds all employees incl
uding their managers. Every employee has an Id, and there is also a column for the m
anager Id.

```
+----+-------+--------+-----------+
| Id | Name  | Salary | ManagerId |
+----+-------+--------+-----------+
| 1  | Joe   | 70000  | 3         |
| 2  | Henry | 80000  | 4         |
| 3  | Sam   | 60000  | NULL      |
| 4  | Max   | 90000  | NULL      |
+----+-------+--------+-----------+
```

Given the Employee table, write a SQL query that finds out employees who earn more t
han their managers. For the above table, Joe is the only employee who earns more tha
n his manager.

```
+----------+
| Employee |
+----------+
| Joe      |
+----------+"¿
```

182. Duplicate Emails https://leetcode.com/problems/duplicate-emails "Write a SQL
query to find all duplicate emails in a table named Person.

```
+----+---------+
| Id | Email   |
+----+---------+
| 1  | a@b.com |
| 2  | c@d.com |
| 3  | a@b.com |
+----+---------+
```

For example, your query should return the following for the above table:

```
+---------+
| Email   |
+---------+
| a@b.com |
+---------+
```

Note: All emails are in lowercase."¿
183. Customers Who Never Order https://leetcode.com/problems/customers-who-never-or
der "Suppose that a website contains two tables, the Customers table and the Orders
table. Write a SQL query to find all customers who never order anything.

Table: Customers.

```
+----+-------+
| Id | Name  |
+----+-------+
| 1  | Joe   |
| 2  | Henry |
| 3  | Sam   |
| 4  | Max   |
+----+-------+
```

Table: Orders.

Id	CustomerId
1	3
2	1

Using the above tables as example, return the following:

Customers
Henry
Max

"¿
184. Department Highest Salary https://leetcode.com/problems/department-highest-sal
ary "The Employee table holds all employees. Every employee has an Id, a salary, and
 there is also a column for the department Id.

Id	Name	Salary	DepartmentId
1	Joe	70000	1
2	Henry	80000	2
3	Sam	60000	2
4	Max	90000	1

The Department table holds all departments of the company.

Id	Name
1	IT
2	Sales

Write a SQL query to find employees who have the highest salary in each of the depar
tments. For the above tables, Max has the highest salary in the IT department and He
nry has the highest salary in the Sales department.

Department	Employee	Salary
IT	Max	90000
Sales	Henry	80000

"¿
185. Department Top Three Salaries https://leetcode.com/problems/department-top-thr
ee-salaries "The Employee table holds all employees. Every employee has an Id, and t
here is also a column for the department Id.

Id	Name	Salary	DepartmentId
1	Joe	70000	1
2	Henry	80000	2
3	Sam	60000	2
4	Max	90000	1
5	Janet	69000	1
6	Randy	85000	1

The Department table holds all departments of the company.

Id	Name

1	IT
2	Sales

Write a SQL query to find employees who earn the top three salaries in each of the d
epartment. For the above tables, your SQL query should return the following rows.

Department	Employee	Salary
IT	Max	90000
IT	Randy	85000
IT	Joe	70000
Sales	Henry	80000
Sales	Sam	60000

"¿
187. Repeated DNA Sequences https://leetcode.com/problems/repeated-dna-sequences
"All DNA is composed of a series of nucleotides abbreviated as A, C, G, and T, for e
xample: ""ACGAATTCCG"". When studying DNA, it is sometimes useful to identify repeat
ed sequences within the DNA.

Write a function to find all the 10-letter-long sequences (substrings) that occur mo
re than once in a DNA molecule.

Example:

Input: s = ""AAAAACCCCCAAAAACCCCCCAAAAAGGGTTT""

Output: [""AAAAACCCCC"", ""CCCCCAAAAA""]"¿
188. Best Time to Buy and Sell Stock IV https://leetcode.com/problems/best-time-to-b
uy-and-sell-stock-iv "Say you have an array for which the ith element is the pric
e of a given stock on day i.

Design an algorithm to find the maximum profit. You may complete at most k transacti
ons.

Note:

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

Example 1:

Input: [2,4,1], k = 2
Output: 2
Explanation: Buy on day 1 (price = 2) and sell on day 2 (price = 4), profit = 4-2 =
2.

Example 2:

Input: [3,2,6,5,0,3], k = 2
Output: 7
Explanation: Buy on day 2 (price = 2) and sell on day 3 (price = 6), profit = 6-2 =
4.
 Then buy on day 5 (price = 0) and sell on day 6 (price = 3), profit = 3
-0 = 3.

Credits:

Special thanks to @Freezen for adding this problem and creating all test cases."¿
189. Rotate Array https://leetcode.com/problems/rotate-array "Given an array, rot
ate the array to the right by k steps, where k is non-negative.

Example 1:

Input: [1,2,3,4,5,6,7] and k = 3
Output: [5,6,7,1,2,3,4]
Explanation:
rotate 1 steps to the right: [7,1,2,3,4,5,6]
rotate 2 steps to the right: [6,7,1,2,3,4,5]

rotate 3 steps to the right: [5,6,7,1,2,3,4]

Example 2:

Input: [-1,-100,3,99] and k = 2
Output: [3,99,-1,-100]
Explanation:
rotate 1 steps to the right: [99,-1,-100,3]
rotate 2 steps to the right: [3,99,-1,-100]

Note:

Try to come up as many solutions as you can, there are at least 3 different ways to solve this problem.
Could you do it in-place with O(1) extra space?

Credits:

Special thanks to @Freezen for adding this problem and creating all test cases."¿
190. Reverse Bits https://leetcode.com/problems/reverse-bits "Reverse bits of a given 32 bits unsigned integer.

Example:

Input: 43261596
Output: 964176192
Explanation: 43261596 represented in binary as 00000010100101000001111010011100,
return 964176192 represented in binary as 00111001011110000010100101000000.

Follow up:

If this function is called many times, how would you optimize it?

Credits:

Special thanks to @ts for adding this problem and creating all test cases."¿
191. Number of 1 Bits https://leetcode.com/problems/number-of-1-bits "Write a function that takes an unsigned integer and returns the number of '1' bits it has (also known as the Hamming weight).

Example :

Input: 11
Output: 3
Explanation: the 32-bit integer 11 has binary representation 00000000000000000000000000001011 .

Credits:

Special thanks to @ts for adding this problem and creating all test cases."¿
192. Word Frequency https://leetcode.com/problems/word-frequency "Write a bash script to calculate the frequency of each word in a text file words.txt.

For simplicity sake, you may assume:

words.txt contains only lowercase characters and space ' ' characters.
Each word must consist of lowercase characters only.
Words are separated by one or more whitespace characters.

Example:

Assume that words.txt has the following content:

the day is sunny the the

the sunny is is

Your script should output the following, sorted by descending frequency:

the 4
is 3
sunny 2
day 1

Note:

    Don't worry about handling ties, it is guaranteed that each word's frequency cou
nt is unique.
    Could you write it in one-line using Unix pipes?"¿
193. Valid Phone Numbers   https://leetcode.com/problems/valid-phone-numbers   "Giv
en a text file file.txt that contains list of phone numbers (one per line), write a
one liner bash script to print all valid phone numbers.

You may assume that a valid phone number must appear in one of the following two for
mats: (xxx) xxx-xxxx or xxx-xxx-xxxx. (x means a digit)

You may also assume each line in the text file must not contain leading or trailing
white spaces.

Example:

Assume that file.txt has the following content:

987-123-4567
123 456 7890
(123) 456-7890

Your script should output the following valid phone numbers:

987-123-4567
(123) 456-7890"¿
194. Transpose File https://leetcode.com/problems/transpose-file   "Given a text fi
le file.txt, transpose its content.

You may assume that each row has the same number of columns and each field is separa
ted by the ' ' character.

Example:

If file.txt has the following content:

name age
alice 21
ryan 30

Output the following:

name alice ryan
age 21 30"¿
195. Tenth Line https://leetcode.com/problems/tenth-line   "Given a text file file.
txt, print just the 10th line of the file.

Example:

Assume that file.txt has the following content:

Line 1
Line 2
Line 3
Line 4
Line 5
Line 6
Line 7

```
Line 8
Line 9
Line 10
```

Your script should output the tenth line, which is:

```
Line 10
```

Note:

1. If the file contains less than 10 lines, what should you output?

2. There's at least three different solutions. Try to explore all possibilities."¿
195. Tenth Line https://leetcode.com/problems/tenth-line "Note:

1. If the file contains less than 10 lines, what should you output?

2. There's at least three different solutions. Try to explore all possibilities."¿
196. Delete Duplicate Emails https://leetcode.com/problems/delete-duplicate-email
s "Write a SQL query to delete all duplicate email entries in a table named Person
, keeping only unique emails based on its smallest Id.

```
+----+------------------+
| Id | Email            |
+----+------------------+
| 1  | john@example.com |
| 2  | bob@example.com  |
| 3  | john@example.com |
+----+------------------+
```

Id is the primary key column for this table.

For example, after running your query, the above Person table should have the follow
ing rows:

```
+----+------------------+
| Id | Email            |
+----+------------------+
| 1  | john@example.com |
| 2  | bob@example.com  |
+----+------------------+"¿
```

197. Rising Temperature https://leetcode.com/problems/rising-temperature "Given a
Weather table, write a SQL query to find all dates' Ids with higher temperature com
pared to its previous (yesterday's) dates.

```
+---------+------------------+------------------+
| Id(INT) | RecordDate(DATE) | Temperature(INT) |
+---------+------------------+------------------+
|       1 |       2015-01-01 |               10 |
|       2 |       2015-01-02 |               25 |
|       3 |       2015-01-03 |               20 |
|       4 |       2015-01-04 |               30 |
+---------+------------------+------------------+
```

For example, return the following Ids for the above Weather table:

```
+----+
| Id |
+----+
|  2 |
|  4 |
+----+"¿
```

198. House Robber https://leetcode.com/problems/house-robber "You are a professio
nal robber planning to rob houses along a street. Each house has a certain amount of
money stashed, the only constraint stopping you from robbing each of them is that a
djacent houses have security system connected and it will automatically contact the
police if two adjacent houses were broken into on the same night.

Given a list of non-negative integers representing the amount of money of each house
, determine the maximum amount of money you can rob tonight without alerting the pol
ice.

Example 1:

Input: [1,2,3,1]
Output: 4
Explanation: Rob house 1 (money = 1) and then rob house 3 (money = 3).
Total amount you can rob = 1 + 3 = 4.

Example 2:

Input: [2,7,9,3,1]
Output: 12
Explanation: Rob house 1 (money = 2), rob house 3 (money = 9) and rob house 5 (money = 1).
Total amount you can rob = 2 + 9 + 1 = 12.

Credits:

Special thanks to @ifanchu for adding this problem and creating all test cases. Also thanks to @ts for adding additional test cases."¿
199. Binary Tree Right Side View https://leetcode.com/problems/binary-tree-right-side-view "Given 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.

Example:

Input: [1,2,3,null,5,null,4]
Output: [1, 3, 4]
Explanation:

```
   1            <---
 /   \
2     3         <---
 \     \
  5     4       <---
```

Credits:

Special thanks to @amrsaqr for adding this problem and creating all test cases."¿
200. Number of Islands https://leetcode.com/problems/number-of-islands "Given a 2d grid map of '1's (land) and '0's (water), count the number of islands. An island is surrounded by water and is formed by connecting adjacent lands horizontally or verti cally. You may assume all four edges of the grid are all surrounded by water.

Example 1:

Input:
11110
11010
11000
00000

Output: 1

Example 2:

Input:
11000
11000
00100
00011

Output: 3

Credits:

Special thanks to @mithmatt for adding this problem and creating all test cases."¿
201. Bitwise AND of Numbers Range https://leetcode.com/problems/bitwise-and-of-num bers-range "Given a range [m, n] where 0 <= m <= n <= 2147483647, return the bitwis e AND of all numbers in this range, inclusive.

Example:

Input: [5,7]
Output: 4

Credits:

Special thanks to @amrsaqr for adding this problem and creating all test cases."¿
202. Happy Number https://leetcode.com/problems/happy-number "Write an algorithm to determine if a number is ""happy"".

A happy number is a number defined by the following process: Starting with any positive integer, replace the number by the sum of the squares of its digits, and repeat the process until the number equals 1 (where it will stay), or it loops endlessly in a cycle which does not include 1. Those numbers for which this process ends in 1 are happy numbers.

Example:

Input: 19
Output: true
Explanation:
12 + 92 = 82
82 + 22 = 68
62 + 82 = 100
12 + 02 + 02 = 1

Credits:

Special thanks to @mithmatt and @ts for adding this problem and creating all test cases."¿
203. Remove Linked List Elements https://leetcode.com/problems/remove-linked-list-elements "Remove all elements from a linked list of integers that have value val.

Example:

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

Credits:

Special thanks to @mithmatt for adding this problem and creating all test cases."¿
204. Count Primes https://leetcode.com/problems/count-primes "Count the number of prime numbers less than a non-negative number, n.

Example:

Input: 10
Output: 4
Explanation: There are 4 prime numbers less than 10, they are 2, 3, 5, 7.

Credits:

Special thanks to @mithmatt for adding this problem and creating all test cases."¿
205. Isomorphic Strings https://leetcode.com/problems/isomorphic-strings "Given two strings s and t, determine if they are isomorphic.

Two strings are isomorphic if the characters in s can be replaced to get t.

All occurrences of a character must be replaced with another character while preserving the order of characters. No two characters may map to the same character but a character may map to itself.

Example 1:

Input: s = ""egg"", t = ""add""
Output: true

Example 2:

Input: s = ""foo"", t = ""bar""
Output: false

Example 3:

Input: s = ""paper"", t = ""title""
Output: true

Note:

You may assume both s and t have the same length."¿
206. Reverse Linked List https://leetcode.com/problems/reverse-linked-list "Rev
erse a singly linked list.

click to show more hints.

Hint:
A linked list can be reversed either iteratively or recursively. Could you implement
both?"¿
206. Reverse Linked List https://leetcode.com/problems/reverse-linked-list "Hin
t:
A linked list can be reversed either iteratively or recursively. Could you implement
both?"¿
207. Course Schedule https://leetcode.com/problems/course-schedule "There are a
total of n courses you have to take, labeled from 0 to n - 1.

Some courses may have prerequisites, for example to take course 0 you have to first
take course 1, which is expressed as a pair: [0,1]

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

For example:
2, [[1,0]]
There are a total of 2 courses to take. To take course 1 you should have finished co
urse 0. So it is possible.

2, [[1,0],[0,1]]
There are a total of 2 courses to take. To take course 1 you should have finished co
urse 0, and to take course 0 you should also have finished course 1. So it is imposs
ible.

Note:

The input prerequisites is a graph represented by a list of edges, not adjacency mat
rices. Read more about how a graph is represented.
You may assume that there are no duplicate edges in the input prerequisites.

click to show more hints.

Hints:

This problem is equivalent to finding if a cycle exists in a directed graph. If a cy
cle exists, no topological ordering exists and therefore it will be impossible to ta
ke all courses.
Topological Sort via DFS - A great video tutorial (21 minutes) on Coursera explainin
g the basic concepts of Topological Sort.
Topological sort could also be done via BFS."¿
207. Course Schedule https://leetcode.com/problems/course-schedule "Hints:

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g the basic concepts of Topological Sort.
Topological sort could also be done via BFS."¿
208. Implement Trie (Prefix Tree) https://leetcode.com/problems/implement-trie-pre

fix-tree "Implement a trie with insert, search, and startsWith methods.

Note:

You may assume that all inputs are consist of lowercase letters a-z."¿
209. Minimum Size Subarray Sum https://leetcode.com/problems/minimum-size-subarray-sum "More practice:

If you have figured out the O(n) solution, try coding another solution of which the time complexity is O(n log n)."¿
209. Minimum Size Subarray Sum https://leetcode.com/problems/minimum-size-subarray-sum "Given an array of n positive integers and a positive integer s, find the minimal length of a contiguous subarray of which the sum ¿ s. If there isn't one, return 0 instead.

For example, given the array [2,3,1,2,4,3] and s = 7,

the subarray [4,3] has the minimal length under the problem constraint.

click to show more practice.

More practice:

If you have figured out the O(n) solution, try coding another solution of which the time complexity is O(n log n).

Credits:
Special thanks to @Freezen for adding this problem and creating all test cases."¿
210. Course Schedule II https://leetcode.com/problems/course-schedule-ii "There are a total of n courses you have to take, labeled from 0 to n - 1.

Some courses may have prerequisites, for example to take course 0 you have to first take course 1, which is expressed as a pair: [0,1]

Given the total number of courses and a list of prerequisite pairs, return the ordering of courses you should take to finish all courses.

There may be multiple correct orders, you just need to return one of them. If it is impossible to finish all courses, return an empty array.

For example:

2, [[1,0]]

There are a total of 2 courses to take. To take course 1 you should have finished course 0. So the correct course order is [0,1]

4, [[1,0],[2,0],[3,1],[3,2]]

There are a total of 4 courses to take. To take course 3 you should have finished both courses 1 and 2. Both courses 1 and 2 should be taken after you finished course 0. So one correct course order is [0,1,2,3]. Another correct ordering is[0,2,1,3].

Note:

The input prerequisites is a graph represented by a list of edges, not adjacency matrices. Read more about how a graph is represented.
You may assume that there are no duplicate edges in the input prerequisites.

click to show more hints.

Hints:

This problem is equivalent to finding the topological order in a directed graph. If a cycle exists, no topological ordering exists and therefore it will be impossible to take all courses.
Topological Sort via DFS - A great video tutorial (21 minutes) on Coursera explaining the basic concepts of Topological Sort.
Topological sort could also be done via BFS."¿
211. Add and Search Word - Data structure design https://leetcode.com/problems/add-and-search-word-data-structure-design "Design a data structure that supports the following two operations:

void addWord(word)
bool search(word)

search(word) can search a literal word or a regular expression string containing only letters a-z or .. A . means it can represent any one letter.

For example:
addWord(""bad"")
addWord(""dad"")
addWord(""mad"")
search(""pad"") -> false
search(""bad"") -> true
search(""..ad"") -> true
search(""b.."") -> true

Note:

You may assume that all words are consist of lowercase letters a-z.

click to show hint.

You should be familiar with how a Trie works. If not, please work on this problem: Implement Trie (Prefix Tree) first."¿
211. Add and Search Word - Data structure design https://leetcode.com/problems/add-and-search-word-data-structure-design "You should be familiar with how a Trie works. If not, please work on this problem: Implement Trie (Prefix Tree) first."¿
212. Word Search II https://leetcode.com/problems/word-search-ii "Given a 2D board and a list of words from the dictionary, find all words in the board.

Each word must be constructed from letters of sequentially adjacent cell, where ""adjacent"" cells are those horizontally or vertically neighboring. The same letter cell may not be used more than once in a word.

For example,

Given words = [""oath"",""pea"",""eat"",""rain""] and board =
[
  ['o','a','a','n'],
  ['e','t','a','e'],
  ['i','h','k','r'],
  ['i','f','l','v']
]

Return [""eat"",""oath""].

Note:

You may assume that all inputs are consist of lowercase letters a-z.

click to show hint.

You would need to optimize your backtracking to pass the larger test. Could you stop backtracking earlier?

If the current candidate does not exist in all words' prefix, you could stop backtracking immediately. What kind of data structure could answer such query efficiently? Does a hash table work? Why or why not? How about a Trie? If you would like to learn how to implement a basic trie, please work on this problem: Implement Trie (Prefix Tree) first."¿
212. Word Search II https://leetcode.com/problems/word-search-ii "You would need to optimize your backtracking to pass the larger test. Could you stop backtracking earlier?

If the current candidate does not exist in all words' prefix, you could stop backtracking immediately. What kind of data structure could answer such query efficiently? Does a hash table work? Why or why not? How about a Trie? If you would like to learn how to implement a basic trie, please work on this problem: Implement Trie (Prefix Tree) first."¿
213. House Robber II https://leetcode.com/problems/house-robber-ii "Note: This is an extension of House Robber.

After robbing those houses on that street, the thief has found himself a new place for his thievery so that he will not get too much attention. This time, all houses at this place are arranged in a circle. That means the first house is the neighbor of the last one. Meanwhile, the security system for these houses remain the same as for those in the previous street.

Given a list of non-negative integers representing the amount of money of each house, determine the maximum amount of money you can rob tonight without alerting the police.

Credits:
Special thanks to @Freezen for adding this problem and creating all test cases."¿
214. Shortest Palindrome https://leetcode.com/problems/shortest-palindrome "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"".

Credits:
Special thanks to @ifanchu for adding this problem and creating all test cases. Thanks to @Freezen for additional test cases."¿
215. Kth Largest Element in an Array https://leetcode.com/problems/kth-largest-element-in-an-array "Find the kth largest element in an unsorted array. Note that it is the kth largest element in the sorted order, not the kth distinct element.

For example,

Given [3,2,1,5,6,4] and k = 2, return 5.

Note:

You may assume k is always valid, 1 ¿ k ¿ array's length.

Credits:

Special thanks to @mithmatt for adding this problem and creating all test cases."¿
216. Combination Sum III https://leetcode.com/problems/combination-sum-iii "Find all possible combinations of k numbers that add up to a number n, given that only numbers from 1 to 9 can be used and each combination should be a unique set of numbers.

Example 1:
Input: k = 3, n = 7
Output:
[[1,2,4]]

Example 2:
Input: k = 3, n = 9
Output:
[[1,2,6], [1,3,5], [2,3,4]]

Credits:
Special thanks to @mithmatt for adding this problem and creating all test cases."¿
216. Combination Sum III https://leetcode.com/problems/combination-sum-iii "Find all possible combinations of k numbers that add up to a number n, given that only numbers from 1 to 9 can be used and each combination should be a unique set of numbers."¿
216. Combination Sum III https://leetcode.com/problems/combination-sum-iii "Example 1:
Input: k = 3, n = 7
Output:
[[1,2,4]]

Example 2:
Input: k = 3, n = 9
Output:
[[1,2,6], [1,3,5], [2,3,4]]"¿
217. Contains Duplicate https://leetcode.com/problems/contains-duplicate "Given an array of integers, find if the array contains any duplicates. Your function should return true if any value appears at least twice in the array, and it should return false if every element is distinct."¿
218. The Skyline Problem https://leetcode.com/problems/the-skyline-problem "A city's skyline is the outer contour of the silhouette formed by all the buildings in that city when viewed from a distance. Now suppose you are given the locations and height of all the buildings as shown on a cityscape photo (Figure A), write a program to output the skyline formed by these buildings collectively (Figure B).

The geometric information of each building is represented by a triplet of integers [Li, Ri, Hi], where Li and Ri are the x coordinates of the left and right edge of the ith building, respectively, and Hi is its height. It is guaranteed that 0 ¿ Li, Ri ¿ INT_MAX, 0 < Hi ¿ INT_MAX, and Ri - Li > 0. You may assume all buildings are perfect rectangles grounded on an absolutely flat surface at height 0.

For instance, the dimensions of all buildings in Figure A are recorded as: [[2 9 10], [3 7 15], [5 12 12], [15 20 10], [19 24 8]] .

The output is a list of ""key points"" (red dots in Figure B) in the format of [[x1,y1], [x2, y2], [x3, y3], ...] that uniquely defines a skyline. A key point is the left endpoint of a horizontal line segment. Note that the last key point, where the rightmost building ends, is merely used to mark the termination of the skyline, and always has zero height. Also, the ground in between any two adjacent buildings should be considered part of the skyline contour.

For instance, the skyline in Figure B should be represented as:[[2 10], [3 15], [7 12], [12 0], [15 10], [20 8], [24, 0]].

Notes:

The number of buildings in any input list is guaranteed to be in the range [0, 1000

0].
 The input list is already sorted in ascending order by the left x position Li.
 The output list must be sorted by the x position.
 There must be no consecutive horizontal lines of equal height in the output skyline
. For instance, [...[2 3], [4 5], [7 5], [11 5], [12 7]...] is not acceptable; the t
hree lines of height 5 should be merged into one in the final output as such: [...[2
 3], [4 5], [12 7], ...]

Credits:
Special thanks to @stellari for adding this problem, creating these two awesome imag
es and all test cases."¿
219. Contains Duplicate II https://leetcode.com/problems/contains-duplicate-ii "Giv
en an array of integers and an integer k, find out whether there are two distinct in
dices i and j in the array such that nums[i] = nums[j] and the absolute difference b
etween i and j is at most k."¿
220. Contains Duplicate III https://leetcode.com/problems/contains-duplicate-iii
"Given an array of integers, find out whether there are two distinct indices i and j
 in the array such that the absolute difference between nums[i] and nums[j] is at mo
st t and the absolute difference between i and j is at most k."¿
221. Maximal Square https://leetcode.com/problems/maximal-square   "Given a 2D bina
ry matrix filled with 0's and 1's, find the largest square containing only 1's and r
eturn its area.

For example, given the following matrix:
1 0 1 0 0
1 0 1 1 1
1 1 1 1 1
1 0 0 1 0

Return 4.

Credits:
Special thanks to @Freezen for adding this problem and creating all test cases."¿
222. Count Complete Tree Nodes https://leetcode.com/problems/count-complete-tree-no
des "Given a complete binary tree, count the number of nodes.

Definition of a complete binary tree from Wikipedia:

In a complete binary tree every level, except possibly the last, is completely fille
d, and all nodes in the last level are as far left as possible. It can have between
1 and 2h nodes inclusive at the last level h."¿
223. Rectangle Area https://leetcode.com/problems/rectangle-area   "Find the total
area covered by two rectilinear rectangles in a 2D plane.

Each rectangle is defined by its bottom left corner and top right corner as shown in
 the figure.

Assume that the total area is never beyond the maximum possible value of int.

Credits:

Special thanks to @mithmatt for adding this problem, creating the above image and al
l test cases."¿
224. Basic Calculator   https://leetcode.com/problems/basic-calculator "Implement a
 basic calculator to evaluate a simple expression string.

The expression string may contain open (and closing parentheses), the plus + or mi
nus sign -, non-negative integers and empty spaces .

You may assume that the given expression is always valid.

Some examples:

""1 + 1"" = 2
"" 2-1 + 2 "" = 3
""(1+(4+5+2)-3)+(6+8)"" = 23

Note: Do not use the eval built-in library function."¿
225. Implement Stack using Queues https://leetcode.com/problems/implement-stack-using-queues "Implement the following operations of a stack using queues.

push(x) -- Push element x onto stack.

pop() -- Removes the element on top of the stack.

top() -- Get the top element.

empty() -- Return whether the stack is empty.

Notes:

You must use only standard operations of a queue -- which means only push to back, peek/pop from front, size, and is empty operations are valid.
Depending on your language, queue may not be supported natively. You may simulate a queue by using a list or deque (double-ended queue), as long as you use only standard operations of a queue.
You may assume that all operations are valid (for example, no pop or top operations will be called on an empty stack).

Credits:
Special thanks to @jianchao.li.fighter for adding this problem and all test cases."¿
226. Invert Binary Tree https://leetcode.com/problems/invert-binary-tree "Invert a binary tree.

```
     4
   /   \
  2     7
 / \   / \
1   3 6   9
```

to

```
     4
   /   \
  7     2
 / \   / \
9   6 3   1
```

Trivia:

This problem was inspired by this original tweet by Max Howell:

Google: 90% of our engineers use the software you wrote (Homebrew), but you can¿t invert a binary tree on a whiteboard so f*** off."¿
227. Basic Calculator II https://leetcode.com/problems/basic-calculator-ii "Implement a basic calculator to evaluate a simple expression string.

The expression string contains only non-negative integers, +, -, *, / operators and empty spaces . The integer division should truncate toward zero.

You may assume that the given expression is always valid.

Some examples:

""3+2*2"" = 7
"" 3/2 "" = 1
"" 3+5 / 2 "" = 5

Note: Do not use the eval built-in library function.

Credits:
Special thanks to @ts for adding this problem and creating all test cases."¿
228. Summary Ranges https://leetcode.com/problems/summary-ranges "Given a sorted integer array without duplicates, return the summary of its ranges.

Example 1:

Input: [0,1,2,4,5,7]
Output: [""0->2"",""4->5"",""7""]

Example 2:

Input: [0,2,3,4,6,8,9]
Output: [""0"",""2->4"",""6"",""8->9""]

Credits:
Special thanks to @jianchao.li.fighter for adding this problem and creating all test cases."¿
229. Majority Element II https://leetcode.com/problems/majority-element-ii "Given an integer array of size n, find all elements that appear more than ¿ n/3 ¿ times. The algorithm should run in linear time and in O(1) space."¿
230. Kth Smallest Element in a BST https://leetcode.com/problems/kth-smallest-element-in-a-bst "Given a binary search tree, write a function kthSmallest to find the kth smallest element in it.

Note:

You may assume k is always valid, 1 ¿ k ¿ BST's total elements.

Follow up:

What if the BST is modified (insert/delete operations) often and you need to find the kth smallest frequently? How would you optimize the kthSmallest routine?

Credits:
Special thanks to @ts for adding this problem and creating all test cases."¿
231. Power of Two https://leetcode.com/problems/power-of-two "Given an integer, write a function to determine if it is a power of two.

Credits:
Special thanks to @jianchao.li.fighter for adding this problem and creating all test cases."¿
232. Implement Queue using Stacks https://leetcode.com/problems/implement-queue-using-stacks "Implement the following operations of a queue using stacks.

push(x) -- Push element x to the back of queue.

pop() -- Removes the element from in front of queue.

peek() -- Get the front element.

empty() -- Return whether the queue is empty.

Notes:

You must use only standard operations of a stack -- which means only push to top, peek/pop from top, size, and is empty operations are valid.

Depending on your language, stack may not be supported natively. You may simulate a stack by using a list or deque (double-ended queue), as long as you use only standard operations of a stack.
You may assume that all operations are valid (for example, no pop or peek operations will be called on an empty queue)."¿
233. Number of Digit One https://leetcode.com/problems/number-of-digit-one "Given an integer n, count the total number of digit 1 appearing in all non-negative integers less than or equal to n.

For example:

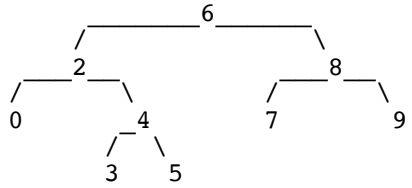
Given n = 13,

Return 6, because digit 1 occurred in the following numbers: 1, 10, 11, 12, 13."¿
234. Palindrome Linked List https://leetcode.com/problems/palindrome-linked-list "Given a singly linked list, determine if it is a palindrome.

Follow up:

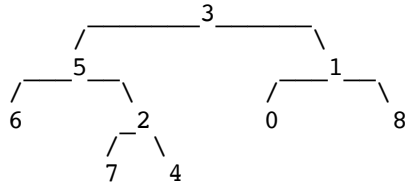
Could you do it in O(n) time and O(1) space?"¿
235. Lowest Common Ancestor of a Binary Search Tree https://leetcode.com/problems/lowest-common-ancestor-of-a-binary-search-tree "Given a binary search tree (BST), find the lowest common ancestor (LCA) of two given nodes in the BST.

According to the definition of LCA on Wikipedia: ¿The lowest common ancestor is defined between two nodes v and w as the lowest node in T that has both v and w as descendants (where we allow a node to be a descendant of itself).¿



For example, the lowest common ancestor (LCA) of nodes 2 and 8 is 6. Another example is LCA of nodes 2 and 4 is 2, since a node can be a descendant of itself according to the LCA definition."¿
236. Lowest Common Ancestor of a Binary Tree https://leetcode.com/problems/lowest-common-ancestor-of-a-binary-tree "Given a binary tree, find the lowest common ancestor (LCA) of two given nodes in the tree.

According to the definition of LCA on Wikipedia: ¿The lowest common ancestor is defined between two nodes v and w as the lowest node in T that has both v and w as descendants (where we allow a node to be a descendant of itself).¿



For example, the lowest common ancestor (LCA) of nodes 5 and 1 is 3. Another example is LCA of nodes 5 and 4 is 5, since a node can be a descendant of itself according to the LCA definition."¿
237. Delete Node in a Linked List https://leetcode.com/problems/delete-node-in-a-linked-list "Write a function to delete a node (except the tail) in a singly linked list, given only access to that node.

Supposed the linked list is 1 -> 2 -> 3 -> 4 and you are given the third node with v
alue 3, the linked list should become 1 -> 2 -> 4 after calling your function."¿
238. Product of Array Except Self https://leetcode.com/problems/product-of-array-e
xcept-self "Given an array of n integers where n > 1, nums, return an array output
such that output[i] is equal to the product of all the elements of nums except nums[
i].

Solve it without division and in O(n).

For example, given [1,2,3,4], return [24,12,8,6].

Follow up:

Could you solve it with constant space complexity? (Note: The output array does not
count as extra space for the purpose of space complexity analysis.)"¿
239. Sliding Window Maximum https://leetcode.com/problems/sliding-window-maximum
"Given an array nums, there is a sliding window of size k which is moving from the v
ery left of the array to the very right. You can only see the k numbers in the windo
w. Each time the sliding window moves right by one position.

For example,

Given nums = [1,3,-1,-3,5,3,6,7], and k = 3.

```
Window position                Max
---------------               -----
[1  3  -1] -3  5  3  6  7       3
 1 [3  -1  -3] 5  3  6  7       3
 1  3 [-1  -3  5] 3  6  7       5
 1  3  -1 [-3  5  3] 6  7       5
 1  3  -1  -3 [5  3  6] 7       6
 1  3  -1  -3  5 [3  6  7]      7
```

Therefore, return the max sliding window as [3,3,5,5,6,7].

Note:

You may assume k is always valid, ie: 1 ¿ k ¿ input array's size for non-empty array
.

Follow up:

Could you solve it in linear time?"¿
240. Search a 2D Matrix II https://leetcode.com/problems/search-a-2d-matrix-ii "Wri
te an efficient algorithm that searches for a value in an m x n matrix. This matrix
has the following properties:

Integers in each row are sorted in ascending from left to right.
Integers in each column are sorted in ascending from top to bottom.

For example,

Consider the following matrix:

```
[
  [1,   4,  7, 11, 15],
  [2,   5,  8, 12, 19],
  [3,   6,  9, 16, 22],
  [10, 13, 14, 17, 24],
  [18, 21, 23, 26, 30]
]
```

Given target = 5, return true.
Given target = 20, return false."¿

241. Different Ways to Add Parentheses https://leetcode.com/problems/different-ways-to-add-parentheses "Given a string of numbers and operators, return all possible results from computing all the different possible ways to group numbers and operators. The valid operators are +, - and *.

Example 1
Input: ""2-1-1"".
((2-1)-1) = 0
(2-(1-1)) = 2
Output: [0, 2]

Example 2
Input: ""2*3-4*5""
(2*(3-(4*5))) = -34
((2*3)-(4*5)) = -14
((2*(3-4))*5) = -10
(2*((3-4)*5)) = -10
(((2*3)-4)*5) = 10
Output: [-34, -14, -10, -10, 10]

Credits:
Special thanks to @mithmatt for adding this problem and creating all test cases."¿
242. Valid Anagram https://leetcode.com/problems/valid-anagram "Given two strings s and t, write a function to determine if t is an anagram of s.

For example,

s = ""anagram"", t = ""nagaram"", return true.

s = ""rat"", t = ""car"", return false.

Note:

You may assume the string contains only lowercase alphabets.

Follow up:

What if the inputs contain unicode characters? How would you adapt your solution to such case?"¿
257. Binary Tree Paths https://leetcode.com/problems/binary-tree-paths "Given a binary tree, return all root-to-leaf paths.

For example, given the following binary tree:


```
   1
 /   \
2     3
 \
  5
```


All root-to-leaf paths are:
[""1->2->5"", ""1->3""]

Credits:
Special thanks to @jianchao.li.fighter for adding this problem and creating all test cases."¿
258. Add Digits https://leetcode.com/problems/add-digits   "Given a non-negative integer num, repeatedly add all its digits until the result has only one digit.

For example:

Given num = 38, the process is like: 3 + 8 = 11, 1 + 1 = 2. Since 2 has only one digit, return it.

Follow up:

Could you do it without any loop/recursion in O(1) runtime?

Credits:
Special thanks to @jianchao.li.fighter for adding this problem and creating all test cases."¿
260. Single Number III https://leetcode.com/problems/single-number-iii "Given an array of numbers nums, in which exactly two elements appear only once and all the other elements appear exactly twice. Find the two elements that appear only once.

For example:

Given nums = [1, 2, 1, 3, 2, 5], return [3, 5].

Note:

The order of the result is not important. So in the above example, [5, 3] is also correct.
Your algorithm should run in linear runtime complexity. Could you implement it using only constant space complexity?

Credits:
Special thanks to @jianchao.li.fighter for adding this problem and creating all test cases."¿
262. Trips and Users https://leetcode.com/problems/trips-and-users "The Trips table holds all taxi trips. Each trip has a unique Id, while Client_Id and Driver_Id are both foreign keys to the Users_Id at the Users table. Status is an ENUM type of (¿completed¿, ¿cancelled_by_driver¿, ¿cancelled_by_client¿).

Id	Client_Id	Driver_Id	City_Id	Status	Request_at
1	1	10	1	completed	2013-10-01
2	2	11	1	cancelled_by_driver	2013-10-01
3	3	12	6	completed	2013-10-01
4	4	13	6	cancelled_by_client	2013-10-01
5	1	10	1	completed	2013-10-02
6	2	11	6	completed	2013-10-02
7	3	12	6	completed	2013-10-02
8	2	12	12	completed	2013-10-03
9	3	10	12	completed	2013-10-03
10	4	13	12	cancelled_by_driver	2013-10-03

The Users table holds all users. Each user has an unique Users_Id, and Role is an ENUM type of (¿client¿, ¿driver¿, ¿partner¿).

Users_Id	Banned	Role
1	No	client
2	Yes	client
3	No	client
4	No	client
10	No	driver
11	No	driver
12	No	driver
13	No	driver

Write a SQL query to find the cancellation rate of requests made by unbanned users b

etween Oct 1, 2013 and Oct 3, 2013. For the above tables, your SQL query should retu
rn the following rows with the cancellation rate being rounded to two decimal places
.

Day	Cancellation Rate
2013-10-01	0.33
2013-10-02	0.00
2013-10-03	0.50

Credits:

Special thanks to @cak1erlizhou for contributing this question, writing the problem
description and adding part of the test cases."¿
263. Ugly Number https://leetcode.com/problems/ugly-number "Write a program to
check whether a given number is an ugly number.

Ugly numbers are positive numbers whose prime factors only include 2, 3, 5. For exam
ple, 6, 8 are ugly while 14 is not ugly since it includes another prime factor 7.

Note:

    1 is typically treated as an ugly number.
    Input is within the 32-bit signed integer range.

Credits:

Special thanks to @jianchao.li.fighter for adding this problem and creating all test
 cases."¿
264. Ugly Number II https://leetcode.com/problems/ugly-number-ii "Write a program
 to find the n-th ugly number.

Ugly numbers are positive numbers whose prime factors only include 2, 3, 5. For exam
ple, 1, 2, 3, 4, 5, 6, 8, 9, 10, 12 is the sequence of the first 10 ugly numbers.

Note that 1 is typically treated as an ugly number, and n does not exceed 1690.

Credits:
Special thanks to @jianchao.li.fighter for adding this problem and creating all test
 cases."¿
268. Missing Number https://leetcode.com/problems/missing-number "Given an array
containing n distinct numbers taken from 0, 1, 2, ..., n, find the one that is missi
ng from the array.

Example 1
Input: [3,0,1]
Output: 2

Example 2
Input: [9,6,4,2,3,5,7,0,1]
Output: 8

Note:

Your algorithm should run in linear runtime complexity. Could you implement it using only constant extra space complexity?

Credits:
Special thanks to @jianchao.li.fighter for adding this problem and creating all test cases."¿
273. Integer to English Words https://leetcode.com/problems/integer-to-english-words "Convert a non-negative integer to its english words representation. Given input is guaranteed to be less than 231 - 1.

For example,

123 -> ""One Hundred Twenty Three""
12345 -> ""Twelve Thousand Three Hundred Forty Five""
1234567 -> ""One Million Two Hundred Thirty Four Thousand Five Hundred Sixty Seven""
"¿
274. H-Index https://leetcode.com/problems/h-index "Given an array of citations (each citation is a non-negative integer) of a researcher, write a function to compute the researcher's h-index.

According to the definition of h-index on Wikipedia: ""A scientist has index h if h of his/her N papers have at least h citations each, and the other N ¿ h papers have no more than h citations each.""

For example, given citations = [3, 0, 6, 1, 5], which means the researcher has 5 papers in total and each of them had received 3, 0, 6, 1, 5 citations respectively. Since the researcher has 3 papers with at least 3 citations each and the remaining two with no more than 3 citations each, his h-index is 3.

Note: If there are several possible values for h, the maximum one is taken as the h-index.

Credits:
Special thanks to @jianchao.li.fighter for adding this problem and creating all test cases."¿
275. H-Index II https://leetcode.com/problems/h-index-ii Follow up for H-Index: What if the citations array is sorted in ascending order? Could you optimize your algorithm?¿
278. First Bad Version https://leetcode.com/problems/first-bad-version "You are a product manager and currently leading a team to develop a new product. Unfortunately, the latest version of your product fails the quality check. Since each version is developed based on the previous version, all the versions after a bad version are also bad.

Suppose you have n versions [1, 2, ..., n] and you want to find out the first bad one, which causes all the following ones to be bad.

You are given an API bool isBadVersion(version) which will return whether version is bad. Implement a function to find the first bad version. You should minimize the number of calls to the API.

Credits:
Special thanks to @jianchao.li.fighter for adding this problem and creating all test cases."¿
279. Perfect Squares https://leetcode.com/problems/perfect-squares "Given a positive integer n, find the least number of perfect square numbers (for example, 1, 4, 9, 16, ...) which sum to n.

For example, given n = 12, return 3 because 12 = 4 + 4 + 4; given n = 13, return 2 b
ecause 13 = 4 + 9.

Credits:
Special thanks to @jianchao.li.fighter for adding this problem and creating all test
 cases."¿
282. Expression Add Operators https://leetcode.com/problems/expression-add-operato
rs "Given a string that contains only digits 0-9 and a target value, return all pos
sibilities to add binary operators (not unary) +, -, or * between the digits so they
 evaluate to the target value.

Examples:

""123"", 6 -> [""1+2+3"", ""1*2*3""]
""232"", 8 -> [""2*3+2"", ""2+3*2""]
""105"", 5 -> [""1*0+5"",""10-5""]
""00"", 0 -> [""0+0"", ""0-0"", ""0*0""]
""3456237490"", 9191 -> []

Credits:
Special thanks to @davidtan1890 for adding this problem and creating all test cases.
"¿
283. Move Zeroes https://leetcode.com/problems/move-zeroes "Given an array nums
, write a function to move all 0's to the end of it while maintaining the relative o
rder of the non-zero elements.

For example, given nums = [0, 1, 0, 3, 12], after calling your function, nums shoul
d be [1, 3, 12, 0, 0].

Note:

You must do this in-place without making a copy of the array.
Minimize the total number of operations.

Credits:
Special thanks to @jianchao.li.fighter for adding this problem and creating all test
 cases."¿
284. Peeking Iterator https://leetcode.com/problems/peeking-iterator "Given an It
erator class interface with methods: next() and hasNext(), design and implement a Pe
ekingIterator that support the peek() operation -- it essentially peek() at the elem
ent that will be returned by the next call to next().

Here is an example. Assume that the iterator is initialized to the beginning of the
list: [1, 2, 3].

Call next() gets you 1, the first element in the list.

Now you call peek() and it returns 2, the next element. Calling next() after that st
ill return 2.

You call next() the final time and it returns 3, the last element. Calling hasNext()
 after that should return false.

Follow up: How would you extend your design to be generic and work with all types, n
ot just integer?

Credits:
Special thanks to @porker2008 for adding this problem and creating all test cases."¿
287. Find the Duplicate Number https://leetcode.com/problems/find-the-duplicate-num

ber "Given an array nums containing n + 1 integers where each integer is between 1 a
nd n (inclusive), prove that at least one duplicate number must exist. Assume that t
here is only one duplicate number, find the duplicate one.

Note:

You must not modify the array (assume the array is read only).
You must use only constant, O(1) extra space.
Your runtime complexity should be less than O(n2).
There is only one duplicate number in the array, but it could be repeated more than
once.

Credits:
Special thanks to @jianchao.li.fighter for adding this problem and creating all test
cases."¿
289. Game of Life https://leetcode.com/problems/game-of-life "According to the Wi
kipedia's article: ""The Game of Life, also known simply as Life, is a cellular auto
maton devised by the British mathematician John Horton Conway in 1970.""

Given a board with m by n cells, each cell has an initial state live (1) or dead (0)
. Each cell interacts with its eight neighbors (horizontal, vertical, diagonal) usin
g the following four rules (taken from the above Wikipedia article):

Any live cell with fewer than two live neighbors dies, as if caused by under-populat
ion.
Any live cell with two or three live neighbors lives on to the next generation.
Any live cell with more than three live neighbors dies, as if by over-population..
Any dead cell with exactly three live neighbors becomes a live cell, as if by reprod
uction.

Write a function to compute the next state (after one update) of the board given its
current state.

Follow up:

Could you solve it in-place? Remember that the board needs to be updated at the same
time: You cannot update some cells first and then use their updated values to updat
e other cells.
In this question, we represent the board using a 2D array. In principle, the board i
s infinite, which would cause problems when the active area encroaches the border of
the array. How would you address these problems?

Credits:
Special thanks to @jianchao.li.fighter for adding this problem and creating all test
cases."¿
290. Word Pattern https://leetcode.com/problems/word-pattern "Given a pattern and
a string str, find if str follows the same pattern.
Here follow means a full match, such that there is a bijection between a letter in
pattern and a non-empty word in str.

Examples:

pattern = ""abba"", str = ""dog cat cat dog"" should return true.
pattern = ""abba"", str = ""dog cat cat fish"" should return false.
pattern = ""aaaa"", str = ""dog cat cat dog"" should return false.

pattern = ""abba"", str = ""dog dog dog dog"" should return false.

Notes:

You may assume pattern contains only lowercase letters, and str contains lowercase l
etters separated by a single space.

Credits:
Special thanks to @minglotus6 for adding this problem and creating all test cases."¿
292. Nim Game https://leetcode.com/problems/nim-game "You are playing the followi
ng Nim Game with your friend: There is a heap of stones on the table, each time one
of you take turns to remove 1 to 3 stones. The one who removes the last stone will b
e the winner. You will take the first turn to remove the stones.

Both of you are very clever and have optimal strategies for the game. Write a functi
on to determine whether you can win the game given the number of stones in the heap.

For example, if there are 4 stones in the heap, then you will never win the game: no
matter 1, 2, or 3 stones you remove, the last stone will always be removed by your
friend.

Credits:
Special thanks to @jianchao.li.fighter for adding this problem and creating all test
cases."¿
295. Find Median from Data Stream https://leetcode.com/problems/find-median-from-d
ata-stream "Median is the middle value in an ordered integer list. If the size of t
he list is even, there is no middle value. So the median is the mean of the two midd
le value.
Examples:

[2,3,4] , the median is 3
[2,3], the median is (2 + 3) / 2 = 2.5

Design a data structure that supports the following two operations:

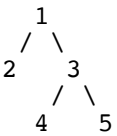
void addNum(int num) - Add a integer number from the data stream to the data structu
re.
double findMedian() - Return the median of all elements so far.

For example:
addNum(1)
addNum(2)
findMedian() -> 1.5
addNum(3)
findMedian() -> 2

Credits:
Special thanks to @Louis1992 for adding this problem and creating all test cases."¿
297. Serialize and Deserialize Binary Tree https://leetcode.com/problems/serialize-
and-deserialize-binary-tree "Serialization is the process of converting a data struc
ture or object into a sequence of bits so that it can be stored in a file or memory
buffer, or transmitted across a network connection link to be reconstructed later in
the same or another computer environment.

Design an algorithm to serialize and deserialize a binary tree. There is no restrict
ion on how your serialization/deserialization algorithm should work. You just need t
o ensure that a binary tree can be serialized to a string and this string can be des
erialized to the original tree structure.

For example, you may serialize the following tree



as ""[1,2,3,null,null,4,5]"", just the same as how LeetCode OJ serializes a binary t
ree. You do not necessarily need to follow this format, so please be creative and co
me up with different approaches yourself.

Note: Do not use class member/global/static variables to store states. Your serializ
e and deserialize algorithms should be stateless.

Credits:

Special thanks to @Louis1992 for adding this problem and creating all test cases."¿
299. Bulls and Cows https://leetcode.com/problems/bulls-and-cows "You are playing
the following Bulls and Cows game with your friend: You write down a number and ask
your friend to guess what the number is. Each time your friend makes a guess, you p
rovide a hint that indicates how many digits in said guess match your secret number
exactly in both digit and position (called ""bulls"") and how many digits match the
secret number but locate in the wrong position (called ""cows""). Your friend will u
se successive guesses and hints to eventually derive the secret number.

For example:
Secret number: ""1807""
Friend's guess: ""7810""

Hint: 1 bull and 3 cows. (The bull is 8, the cows are 0, 1 and 7.)

Write a function to return a hint according to the secret number and friend's guess,
use A to indicate the bulls and B to indicate the cows. In the above example, your
function should return ""1A3B"".

Please note that both secret number and friend's guess may contain duplicate digits,
for example:
Secret number: ""1123""
Friend's guess: ""0111""

In this case, the 1st 1 in friend's guess is a bull, the 2nd or 3rd 1 is a cow, and
your function should return ""1A1B"".

You may assume that the secret number and your friend's guess only contain digits, a
nd their lengths are always equal.

Credits:
Special thanks to @jeantimex for adding this problem and creating all test cases."¿
300. Longest Increasing Subsequence https://leetcode.com/problems/longest-increasing
-subsequence "Given an unsorted array of integers, find the length of longest inc
reasing subsequence.

For example,

Given [10, 9, 2, 5, 3, 7, 101, 18],

The longest increasing subsequence is [2, 3, 7, 101], therefore the length is 4. Not
e that there may be more than one LIS combination, it is only necessary for you to r
eturn the length.

Your algorithm should run in O(n2) complexity.

Follow up: Could you improve it to O(n log n) time complexity?

Credits:
Special thanks to @pbrother for adding this problem and creating all test cases."¿
301. Remove Invalid Parentheses https://leetcode.com/problems/remove-invalid-parenth
eses "Remove the minimum number of invalid parentheses in order to make the input
string valid. Return all possible results.

Note: The input string may contain letters other than the parentheses (and).

Examples:

""()())()"" -> [""()()()"", ""(())()""]
""(a())()"" -> [""(a)()()"", ""(a())()""]
"")("" -> [""""]

Credits:
Special thanks to @hpplayer for adding this problem and creating all test cases."¿
303. Range Sum Query - Immutable https://leetcode.com/problems/range-sum-query-im
mutable "Given an integer array nums, find the sum of the elements between indices i
and j (i ¿ j), inclusive.

Example:

Given nums = [-2, 0, 3, -5, 2, -1]

sumRange(0, 2) -> 1
sumRange(2, 5) -> -1
sumRange(0, 5) -> -3

Note:

You may assume that the array does not change.
There are many calls to sumRange function."¿
304. Range Sum Query 2D - Immutable https://leetcode.com/problems/range-sum-query-2d
-immutable "Given a 2D matrix matrix, find the sum of the elements inside the recta
ngle defined by its upper left corner (row1, col1) and lower right corner (row2, col
2).

The above rectangle (with the red border) is defined by (row1, col1) = (2, 1) and (r
ow2, col2) = (4, 3), which contains sum = 8.

Example:

```
Given matrix = [
  [3, 0, 1, 4, 2],
  [5, 6, 3, 2, 1],
  [1, 2, 0, 1, 5],
  [4, 1, 0, 1, 7],
  [1, 0, 3, 0, 5]
]

sumRegion(2, 1, 4, 3) -> 8
sumRegion(1, 1, 2, 2) -> 11
sumRegion(1, 2, 2, 4) -> 12
```

Note:

You may assume that the matrix does not change.
There are many calls to sumRegion function.

You may assume that row1 ¿ row2 and col1 ¿ col2."¿
306. Additive Number https://leetcode.com/problems/additive-number "Additive nu
mber is a string whose digits can form additive sequence.

A valid additive sequence should contain at least three numbers. Except for the firs
t two numbers, each subsequent number in the sequence must be the sum of the precedi
ng two.

For example:

""112358"" is an additive number because the digits can form an additive sequence: 1
, 1, 2, 3, 5, 8.
1 + 1 = 2, 1 + 2 = 3, 2 + 3 = 5, 3 + 5 = 8
""199100199"" is also an additive number, the additive sequence is: 1, 99, 100, 199.
1 + 99 = 100, 99 + 100 = 199

Note: Numbers in the additive sequence cannot have leading zeros, so sequence 1, 2,
03 or 1, 02, 3 is invalid.

Given a string containing only digits '0'-'9', write a function to determine if it's
an additive number.

Follow up:

How would you handle overflow for very large input integers?

Credits:
Special thanks to @jeantimex for adding this problem and creating all test cases."¿
307. Range Sum Query - Mutable https://leetcode.com/problems/range-sum-query-mutabl
e "Given an integer array nums, find the sum of the elements between indices i and
j (i ¿ j), inclusive.

The update(i, val) function modifies nums by updating the element at index i to val.

Example:

Given nums = [1, 3, 5]

sumRange(0, 2) -> 9
update(1, 2)
sumRange(0, 2) -> 8

Note:

The array is only modifiable by the update function.
You may assume the number of calls to update and sumRange function is distributed ev
enly."¿
309. Best Time to Buy and Sell Stock with Cooldown https://leetcode.com/problems/be
st-time-to-buy-and-sell-stock-with-cooldown "Say you have an array 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 transaction
s as you like
(ie, buy one and sell one share of the stock multiple times) with the following rest
rictions:

    You may not engage in multiple transactions at the same time (ie, you must sell
the stock before you buy again).
    After you sell your stock, you cannot buy stock on next day. (ie, cooldown 1 day
)

Example:

```
prices = [1, 2, 3, 0, 2]
maxProfit = 3
transactions = [buy, sell, cooldown, buy, sell]


Credits:
Special thanks to @dietpepsi for adding this problem and creating all test cases."¿
310. Minimum Height Trees   https://leetcode.com/problems/minimum-height-trees  "For
 a undirected graph with tree characteristics, we can choose any node as the root. T
he result graph is then a rooted tree. Among all possible rooted trees, those with m
inimum height are called minimum height trees (MHTs).
    Given such a graph, write a function to find all the MHTs and return a list of t
heir root labels.



    Format

    The graph contains n nodes which are labeled from 0 to n - 1.
    You will be given the number n and a list of undirected edges (each edge is a pa
ir of labels).


You can assume that no duplicate edges will appear in edges. Since all edges are
    undirected, [0, 1] is the same as [1, 0] and thus will not appear together in
    edges.


    Example 1:


    Given n = 4, edges = [[1, 0], [1, 2], [1, 3]]


        0
        |
        1
       / \
      2   3


    return  [1]



    Example 2:


    Given n = 6, edges = [[0, 3], [1, 3], [2, 3], [4, 3], [5, 4]]

     0  1  2
      \ | /
        3
        |
        4
        |
        5


    return  [3, 4]



    Note:


    (1) According to the definition
    of tree on Wikipedia: ¿a tree is an undirected graph in which any two vertices a
re connected by
    exactly one path. In other words, any connected graph without simple cycles is a
 tree.¿
```

(2) The height of a rooted tree is the number of edges on the longest downward p
ath between the root and a
leaf.

Credits:
Special thanks to @dietpepsi for adding this problem and creating all test cases."¿
312. Burst Balloons https://leetcode.com/problems/burst-balloons "Given n balloon
s, indexed from 0 to n-1. Each balloon is painted with a
number on it represented by array nums.

You are asked to burst all the balloons. If the you burst
balloon i you will get nums[left] * nums[i] * nums[right] coins. Here left
and right are adjacent indices of i. After the burst, the left and right
then becomes adjacent.

Find the maximum coins you can collect by bursting the balloons wisely.

Note:

(1) You may imagine nums[-1] = nums[n] = 1. They are not real therefore you can
not burst them.

(2) 0 ¿ n ¿ 500, 0 ¿ nums[i] ¿ 100

Example:

Given [3, 1, 5, 8]

Return 167

```
nums = [3,1,5,8] --> [3,5,8] -->   [3,8]   -->  [8]  --> []
coins =  3*1*5      +  3*5*8    +  1*3*8      + 1*8*1   = 167
```

Credits:
Special thanks to @dietpepsi for adding this problem and creating all test cases."¿
313. Super Ugly Number https://leetcode.com/problems/super-ugly-number "Write a pro
gram to find the nth super ugly number.

Super ugly numbers are positive numbers whose all prime factors are in the given
prime list
primes of size k. For example, [1, 2, 4, 7, 8, 13, 14, 16, 19, 26, 28, 32]
is the sequence of the first 12 super ugly numbers given primes
= [2, 7, 13, 19] of size 4.

Note:

(1) 1 is a super ugly number for any given primes.

(2) The given numbers in primes are in ascending order.

(3) 0 < k ¿ 100, 0 < n ¿ 106, 0 < primes[i] < 1000.

(4) The nth super ugly number is guaranteed to fit in a 32-bit signed integer.

Credits:
Special thanks to @dietpepsi for adding this problem and creating all test cases."¿
315. Count of Smaller Numbers After Self https://leetcode.com/problems/count-of-s
maller-numbers-after-self "You are given an integer array nums and you have to ret

urn a new counts array.
The counts array has the property where counts[i] is
the number of smaller elements to the right of nums[i].

Example:

Given nums = [5, 2, 6, 1]

To the right of 5 there are 2 smaller elements (2 and 1).
To the right of 2 there is only 1 smaller element (1).
To the right of 6 there is 1 smaller element (1).
To the right of 1 there is 0 smaller element.

Return the array [2, 1, 1, 0]."¿
316. Remove Duplicate Letters https://leetcode.com/problems/remove-duplicate-letters "Given a string which contains only lowercase letters, remove duplicate letters so that every letter appear once and only once. You must make sure your result is the smallest in lexicographical order among all possible results.

Example:

Given ""bcabc""

Return ""abc""

Given ""cbacdcbc""

Return ""acdb""

Credits:
Special thanks to @dietpepsi for adding this problem and creating all test cases."¿
318. Maximum Product of Word Lengths https://leetcode.com/problems/maximum-product-of-word-lengths "Given a string array words, find the maximum value of length(word[i]) * length(word[j]) where the two words do not share common letters.
You may assume that each word will contain only lower case letters.
If no such two words exist, return 0.

Example 1:

Given [""abcw"", ""baz"", ""foo"", ""bar"", ""xtfn"", ""abcdef""]

Return 16

The two words can be ""abcw"", ""xtfn"".

Example 2:

Given [""a"", ""ab"", ""abc"", ""d"", ""cd"", ""bcd"", ""abcd""]

Return 4

The two words can be ""ab"", ""cd"".

Example 3:

    Given [""a"", ""aa"", ""aaa"", ""aaaa""]

    Return 0

    No such pair of words.

Credits:
Special thanks to @dietpepsi for adding this problem and creating all test cases."¿
319. Bulb Switcher https://leetcode.com/problems/bulb-switcher "There are n bulbs t
hat are initially off. You first turn on all the bulbs. Then, you turn off every sec
ond bulb. On the third round, you toggle every third bulb (turning on if it's off or
 turning off if it's on). For the ith round, you toggle every i bulb. For the nth ro
und, you only toggle the last bulb.

Find how many bulbs are on after n rounds.

Example:

Given n = 3.

At first, the three bulbs are [off, off, off].
After first round, the three bulbs are [on, on, on].
After second round, the three bulbs are [on, off, on].
After third round, the three bulbs are [on, off, off].

So you should return 1, because there is only one bulb is on."¿
321. Create Maximum Number https://leetcode.com/problems/create-maximum-number "Giv
en two arrays of length m and n with digits 0-9 representing two numbers.
    Create the maximum number of length k <= m + n from digits of the two. The relat
ive order of the digits
    from the same array must be preserved. Return an array of the k digits. You shou
ld try to optimize your time and space complexity.

    Example 1:

    nums1 = [3, 4, 6, 5]

    nums2 = [9, 1, 2, 5, 8, 3]

    k = 5

    return [9, 8, 6, 5, 3]

    Example 2:

    nums1 = [6, 7]

    nums2 = [6, 0, 4]

    k = 5

    return [6, 7, 6, 0, 4]

    Example 3:

    nums1 = [3, 9]

    nums2 = [8, 9]

k = 3

return [9, 8, 9]

Credits:
Special thanks to @dietpepsi for adding this problem and creating all test cases."¿
322. Coin Change https://leetcode.com/problems/coin-change "You are given coins of different denominations and a total amount of money amount. Write a function to compute 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.

Example 1:

coins = [1, 2, 5], amount = 11

return 3 (11 = 5 + 5 + 1)

Example 2:

coins = [2], amount = 3

return -1.

Note:

You may assume that you have an infinite number of each kind of coin.

Credits:
Special thanks to @jianchao.li.fighter for adding this problem and creating all test cases."¿
324. Wiggle Sort II https://leetcode.com/problems/wiggle-sort-ii "Given an unsorted array nums, reorder it such that
nums[0] < nums[1] > nums[2] < nums[3]....

Example:

(1) Given nums = [1, 5, 1, 1, 6, 4], one possible answer is [1, 4, 1, 5, 1, 6].

(2) Given nums = [1, 3, 2, 2, 3, 1], one possible answer is [2, 3, 1, 3, 1, 2].

Note:

You may assume all input has valid answer.

Follow Up:

Can you do it in O(n) time and/or in-place with O(1) extra space?

Credits:
Special thanks to @dietpepsi for adding this problem and creating all test cases."¿
326. Power of Three https://leetcode.com/problems/power-of-three "Given an integer, write a function to determine if it is a power of three.

Follow up:

Could you do it without using any loop / recursion?

Credits:
Special thanks to @dietpepsi for adding this problem and creating all test cases."¿
327. Count of Range Sum https://leetcode.com/problems/count-of-range-sum "Given a
n integer array nums, return the number of range sums that lie in [lower, upper] inc
lusive.

Range sum S(i, j) is defined as the sum of the elements in nums between indices
i and
j (i ¿ j), inclusive.

Note:

A naive algorithm of O(n2) is trivial. You MUST do better than that.

Example:

Given nums = [-2, 5, -1], lower = -2, upper = 2,

Return 3.

The three ranges are : [0, 0], [2, 2], [0, 2] and their respective sums are: -2,
-1, 2.

Credits:
Special thanks to @dietpepsi for adding this problem and creating all test cases."¿
328. Odd Even Linked List https://leetcode.com/problems/odd-even-linked-list "Giv
en a singly linked list, group all odd nodes together followed by the even nodes. Pl
ease note here we are talking about the node number and not the value in the nodes.

You should try to do it in place. The program should run in O(1) space complexity an
d O(nodes) time complexity.

Example:

Given 1->2->3->4->5->NULL,

return 1->3->5->2->4->NULL.

Note:

The relative order inside both the even and odd groups should remain as it was in th
e input.

The first node is considered odd, the second node even and so on ...

Credits:
Special thanks to @DjangoUnchained for adding this problem and creating all test cas
es."¿
329. Longest Increasing Path in a Matrix https://leetcode.com/problems/longest-in
creasing-path-in-a-matrix "Given an integer matrix, find the length of the longest
increasing path.

From each cell, you can either move to four directions: left, right, up or down. You
may NOT move diagonally or move outside of the boundary (i.e. wrap-around is not al
lowed).

Example 1:
nums = [
[9,9,4],
[6,6,8],
[2,1,1]
]

Return 4

The longest increasing path is [1, 2, 6, 9].

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

Return 4

The longest increasing path is [3, 4, 5, 6]. Moving diagonally is not allowed.

Credits:
Special thanks to @dietpepsi for adding this problem and creating all test cases."¿ 330. Patching Array https://leetcode.com/problems/patching-array "Given a sorted positive integer array nums and an integer n, add/patch elements to the array such t hat any number in range [1, n] inclusive can be formed by the sum of some elements i n the array. Return the minimum number of patches required.

Example 1:

nums = [1, 3], n = 6

Return 1.

Combinations of nums are [1], [3], [1,3], which form possible sums of: 1, 3, 4.

Now if we add/patch 2 to nums, the combinations are: [1], [2], [3], [1,3], [2,3], [1 ,2,3].

Possible sums are 1, 2, 3, 4, 5, 6, which now covers the range [1, 6].

So we only need 1 patch.

Example 2:

nums = [1, 5, 10], n = 20

Return 2.

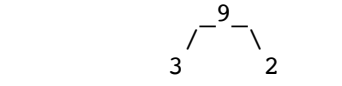
The two patches can be [2, 4].

Example 3:

nums = [1, 2, 2], n = 5

Return 0.

Credits:
Special thanks to @dietpepsi for adding this problem and creating all test cases."¿ 331. Verify Preorder Serialization of a Binary Tree https://leetcode.com/problems/ve rify-preorder-serialization-of-a-binary-tree "One way to serialize a binary tree is to use pre-order traversal. When we encounter a non-null node, we record the node 's value. If it is a null node, we record using a sentinel value such as #.



```
  / \   / \
 4   1  #  6
/ \ / \   / \
# # # #   # #
```

For example, the above binary tree can be serialized to the string ""9,3,4,#,#,1,#,#,2,#,6,#,#"", where # represents a null node.

Given a string of comma separated values, verify whether it is a correct preorder traversal serialization of a binary tree. Find an algorithm without reconstructing the tree.

Each comma separated value in the string must be either an integer or a character '#' representing null pointer.

You may assume that the input format is always valid, for example it could never contain two consecutive commas such as ""1,,3"".

Example 1:

""9,3,4,#,#,1,#,#,2,#,6,#,#""

Return true
Example 2:

""1,#""

Return false
Example 3:

""9,#,#,1""

Return false

Credits:
Special thanks to @dietpepsi for adding this problem and creating all test cases."¿ 332. Reconstruct Itinerary https://leetcode.com/problems/reconstruct-itinerary "Given a list of airline tickets represented by pairs of departure and arrival airports [from, to], reconstruct the itinerary in order. All of the tickets belong to a man who departs from JFK. Thus, the itinerary must begin with JFK.

Note:

If there are multiple valid itineraries, you should return the itinerary that has the smallest lexical order when read as a single string. For example, the itinerary [""JFK"", ""LGA""] has a smaller lexical order than [""JFK"", ""LGB""].
All airports are represented by three capital letters (IATA code).
You may assume all tickets form at least one valid itinerary.

    Example 1:

    tickets = [[""MUC"", ""LHR""], [""JFK"", ""MUC""], [""SFO"", ""SJC""], [""LHR"", ""SFO""]]

    Return [""JFK"", ""MUC"", ""LHR"", ""SFO"", ""SJC""].

    Example 2:

    tickets = [[""JFK"",""SFO""],[""JFK"",""ATL""],[""SFO"",""ATL""],[""ATL"",""JFK""],[""ATL"",""SFO""]]

    Return [""JFK"",""ATL"",""JFK"",""SFO"",""ATL"",""SFO""].

    Another possible reconstruction is [""JFK"",""SFO"",""ATL"",""JFK"",""ATL"",""SF

O""]. But it is larger in lexical order.

Credits:
Special thanks to @dietpepsi for adding this problem and creating all test cases."¿
334. Increasing Triplet Subsequence https://leetcode.com/problems/increasing-triplet
-subsequence "Given an unsorted array return whether an increasing subsequence of
length 3 exists or not in the array.

Formally the function should:

Return true if there exists i, j, k

such that arr[i] < arr[j] < arr[k] given 0 ¿ i < j < k ¿ n-1
else return false.

Your algorithm should run in O(n) time complexity and O(1) space complexity.

Examples:

Given [1, 2, 3, 4, 5],

return true.

Given [5, 4, 3, 2, 1],

return false.

Credits:
Special thanks to @DjangoUnchained for adding this problem and creating all test cas
es."¿
335. Self Crossing https://leetcode.com/problems/self-crossing "You are given an ar
ray x of n positive numbers. You start at point (0,0) and moves x[0] metres to the n
orth, then x[1] metres to the west,
    x[2] metres to the south,
    x[3] metres to the east and so on. In other words, after each move your directio
n changes
    counter-clockwise.

    Write a one-pass algorithm with O(1) extra space to determine, if your path cros
ses itself, or not.

Example 1:

Given x = [2, 1, 1, 2],
?????
?   ?
???????>
    ?

Return true (self crossing)

Example 2:

Given x = [1, 2, 3, 4],
????????
?   ?
?
?
?????????????>

Return false (not self crossing)

Example 3:

Given x = [1, 1, 1, 1],
?????
?   ?
?????>

Return true (self crossing)

Credits:
Special thanks to @dietpepsi for adding this problem and creating all test cases."¿
336. Palindrome Pairs https://leetcode.com/problems/palindrome-pairs "Given a lis
t of unique words, find all pairs of distinct indices (i, j) in the given list, so t
hat the concatenation of the two words, i.e. words[i] + words[j] is a palindrome.

Example 1:

Given words = [""bat"", ""tab"", ""cat""]

Return [[0, 1], [1, 0]]

The palindromes are [""battab"", ""tabbat""]

Example 2:

Given words = [""abcd"", ""dcba"", ""lls"", ""s"", ""sssll""]

Return [[0, 1], [1, 0], [3, 2], [2, 4]]

The palindromes are [""dcbaabcd"", ""abcddcba"", ""slls"", ""llssssll""]

Credits:
Special thanks to @dietpepsi for adding this problem and creating all test cases."¿
337. House Robber III https://leetcode.com/problems/house-robber-iii "The thief h
as found himself a new place for his thievery again. There is only one entrance to t
his area, called the ""root."" Besides the root, each house has one and only one par
ent house. After a tour, the smart thief realized that ""all houses in this place fo
rms a binary tree"". It will automatically contact the police if two directly-linked
 houses were broken into on the same night.

Determine the maximum amount of money the thief can rob tonight without alerting the
 police.

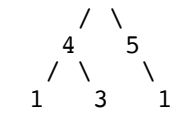
Example 1:

```
     3
    / \
   2   3
    \   \
     3   1
```

Maximum amount of money the thief can rob = 3 + 3 + 1 = 7.

Example 2:

```
     3
```



Maximum amount of money the thief can rob = 4 + 5 = 9.

Credits:
Special thanks to @dietpepsi for adding this problem and creating all test cases."¿
338. Counting Bits https://leetcode.com/problems/counting-bits "Given a non negativ
e integer number num. For every numbers i in the range 0 ¿ i ¿ num calculate the num
ber of 1's in their binary representation and return them as an array.

Example:

For num = 5 you should return [0,1,1,2,1,2].

Follow up:

It is very easy to come up with a solution with run time O(n*sizeof(integer)). But c
an you do it in linear time O(n) /possibly in a single pass?
Space complexity should be O(n).
Can you do it like a boss? Do it without using any builtin function like __builtin_p
opcount in c++ or in any other language.

Credits:
Special thanks to @ syedee for adding this problem and creating all test cases."¿
341. Flatten Nested List Iterator https://leetcode.com/problems/flatten-nested-lis
t-iterator "Given a nested list of integers, implement an iterator to flatten it.

Each element is either an integer, or a list -- whose elements may also be integers
or other lists.

Example 1:

Given the list [[1,1],2,[1,1]],

By calling next repeatedly until hasNext returns false, the order of elements return
ed by next should be: [1,1,2,1,1].

Example 2:

Given the list [1,[4,[6]]],

By calling next repeatedly until hasNext returns false, the order of elements return
ed by next should be: [1,4,6]."¿
342. Power of Four https://leetcode.com/problems/power-of-four "Given an integer (s
igned 32 bits), write a function to check whether it is a power of 4.

Example:

Given num = 16, return true.
Given num = 5, return false.

Follow up: Could you solve it without loops/recursion?

Credits:
Special thanks to @yukuairoy for adding this problem and creating all test cases."¿
343. Integer Break https://leetcode.com/problems/integer-break "Given a positive in
teger n, break it into the sum of at least two positive integers and maximize the pr
oduct of those integers. Return the maximum product you can get.

For example, given n = 2, return 1 (2 = 1 + 1); given n = 10, return 36 (10 = 3 + 3

+ 4).

Note: You may assume that n is not less than 2 and not larger than 58.

Credits:
Special thanks to @jianchao.li.fighter for adding this problem and creating all test cases."¿
344. Reverse String https://leetcode.com/problems/reverse-string "Write a function that takes a string as input and returns the string reversed.

Example:

Given s = ""hello"", return ""olleh"."¿
345. Reverse Vowels of a String https://leetcode.com/problems/reverse-vowels-of-a-string "Write a function that takes a string as input and reverse only the vowels of a string.

Example 1:

Given s = ""hello"", return ""holle"".

Example 2:

Given s = ""leetcode"", return ""leotcede"".

Note:

The vowels does not include the letter ""y"."¿
347. Top K Frequent Elements https://leetcode.com/problems/top-k-frequent-elements "Given a non-empty array of integers, return the k most frequent elements.

For example,

Given [1,1,1,2,2,3] and k = 2, return [1,2].

Note:

You may assume k is always valid, 1 ¿ k ¿ number of unique elements.
Your algorithm's time complexity must be better than O(n log n), where n is the array's size."¿
349. Intersection of Two Arrays https://leetcode.com/problems/intersection-of-two-arrays "Given two arrays, write a function to compute their intersection.

Example:

Given nums1 = [1, 2, 2, 1], nums2 = [2, 2], return [2].

Note:

Each element in the result must be unique.
The result can be in any order."¿
350. Intersection of Two Arrays II https://leetcode.com/problems/intersection-of-two-arrays-ii "Given two arrays, write a function to compute their intersection.

Example:

Given nums1 = [1, 2, 2, 1], nums2 = [2, 2], return [2, 2].

Note:

Each element in the result should appear as many times as it shows in both arrays.
The result can be in any order.

Follow up:

What if the given array is already sorted? How would you optimize your algorithm?
What if nums1's size is small compared to nums2's size? Which algorithm is better?
What if elements of nums2 are stored on disk, and the memory is limited such that yo
u cannot load all elements into the memory at once?"¿
352. Data Stream as Disjoint Intervals https://leetcode.com/problems/data-stream-as
-disjoint-intervals "Given a data stream input of non-negative integers a1, a2, ...,
an, ..., summarize the numbers seen so far as a list of disjoint intervals.

For example, suppose the integers from the data stream are 1, 3, 7, 2, 6, ..., then
the summary will be:
[1, 1]
[1, 1], [3, 3]
[1, 1], [3, 3], [7, 7]
[1, 3], [7, 7]
[1, 3], [6, 7]

Follow up:

What if there are lots of merges and the number of disjoint intervals are small comp
ared to the data stream's size?

Credits:
Special thanks to @yunhong for adding this problem and creating most of the test cas
es."¿
354. Russian Doll Envelopes https://leetcode.com/problems/russian-doll-envelopes
"You have a number of envelopes with widths and heights given as a pair of integers
(w, h). One envelope can fit into another if and only if both the width and height o
f one envelope is greater than the width and height of the other envelope.

What is the maximum number of envelopes can you Russian doll? (put one inside other)

Example:

Given envelopes = [[5,4],[6,4],[6,7],[2,3]], the maximum number of envelopes you can
Russian doll is 3 ([2,3] => [5,4] => [6,7])."¿
355. Design Twitter https://leetcode.com/problems/design-twitter "Design a simpli
fied version of Twitter where users can post tweets, follow/unfollow another user an
d is able to see the 10 most recent tweets in the user's news feed. Your design shou
ld support the following methods:

postTweet(userId, tweetId): Compose a new tweet.
getNewsFeed(userId): Retrieve the 10 most recent tweet ids in the user's news feed.
Each item in the news feed must be posted by users who the user followed or by the u
ser herself. Tweets must be ordered from most recent to least recent.
follow(followerId, followeeId): Follower follows a followee.
unfollow(followerId, followeeId): Follower unfollows a followee.

Example:
Twitter twitter = new Twitter();

// User 1 posts a new tweet (id = 5).
twitter.postTweet(1, 5);

```
// User 1's news feed should return a list with 1 tweet id -> [5].
twitter.getNewsFeed(1);

// User 1 follows user 2.
twitter.follow(1, 2);

// User 2 posts a new tweet (id = 6).
twitter.postTweet(2, 6);

// User 1's news feed should return a list with 2 tweet ids -> [6, 5].
// Tweet id 6 should precede tweet id 5 because it is posted after tweet id 5.
twitter.getNewsFeed(1);

// User 1 unfollows user 2.
twitter.unfollow(1, 2);

// User 1's news feed should return a list with 1 tweet id -> [5],
// since user 1 is no longer following user 2.
twitter.getNewsFeed(1);"¿
357. Count Numbers with Unique Digits   https://leetcode.com/problems/count-numbers-
with-unique-digits  "Given a non-negative integer n, count all numbers with unique d
igits, x, where 0 ¿ x < 10n.


    Example:

Given n = 2, return 91. (The answer should be the total numbers in the range of 0 ¿
x < 100, excluding [11,22,33,44,55,66,77,88,99])


Credits:
Special thanks to @memoryless for adding this problem and creating all test cases."¿
363. Max Sum of Rectangle No Larger Than K  https://leetcode.com/problems/max-sum-of
-rectangle-no-larger-than-k "Given a non-empty 2D matrix matrix and an integer k, fi
nd the max sum of a rectangle in the matrix such that its sum is no larger than k.

Example:

Given matrix = [
  [1,  0, 1],
  [0, -2, 3]
]
k = 2



The answer is 2. Because the sum of rectangle [[0, 1], [-2, 3]] is 2 and 2 is the ma
x number no larger than k (k = 2).

Note:


The rectangle inside the matrix must have an area > 0.
What if the number of rows is much larger than the number of columns?



Credits:
Special thanks to @fujiaozhu for adding this problem and creating all test cases."¿
365. Water and Jug Problem  https://leetcode.com/problems/water-and-jug-problem "You
 are given two jugs with capacities x and y litres. There is an infinite amount of w
ater supply available.
You need to determine whether it is possible to measure exactly z litres using these
 two jugs.

If z liters of water is measurable, you must have z liters of water contained within
 one or both buckets by the end.


Operations allowed:

Fill any of the jugs completely with water.
Empty any of the jugs.
```

Pour water from one jug into another till the other jug is completely full or the fi
rst jug itself is empty.

Example 1: (From the famous ""Die Hard"" example)
Input: x = 3, y = 5, z = 4
Output: True

Example 2:
Input: x = 2, y = 6, z = 5
Output: False

Credits:
Special thanks to @vinod23 for adding this problem and creating all test cases."¿
367. Valid Perfect Square https://leetcode.com/problems/valid-perfect-square "Giv
en a positive integer num, write a function which returns True if num is a perfect s
quare else False.

Note: Do not use any built-in library function such as sqrt.

Example 1:
Input: 16
Returns: True

Example 2:
Input: 14
Returns: False

Credits:
Special thanks to @elmirap for adding this problem and creating all test cases."¿
368. Largest Divisible Subset https://leetcode.com/problems/largest-divisible-subs
et "Given a set of distinct positive integers, find the largest subset such that ev
ery pair (Si, Sj) of elements in this subset satisfies: Si % Sj = 0 or Sj % Si = 0.

If there are multiple solutions, return any subset is fine.

Example 1:
nums: [1,2,3]

Result: [1,2] (of course, [1,3] will also be ok)

Example 2:
nums: [1,2,4,8]

Result: [1,2,4,8]

Credits:
Special thanks to @Stomach_ache for adding this problem and creating all test cases.
"¿
371. Sum of Two Integers https://leetcode.com/problems/sum-of-two-integers "Cal
culate the sum of two integers a and b, but you are not allowed to use the operator
+ and -.

Example:

Given a = 1 and b = 2, return 3.

Credits:
Special thanks to @fujiaozhu for adding this problem and creating all test cases."¿
372. Super Pow https://leetcode.com/problems/super-pow "Your task is to calculate a
b mod 1337 where a is a positive integer and b is an extremely large positive intege
r given in the form of an array.

Example1:
a = 2
b = [3]

Result: 8

Example2:
a = 2
b = [1,0]

Result: 1024

Credits:
Special thanks to @Stomach_ache for adding this problem and creating all test cases.
"¿
373. Find K Pairs with Smallest Sums   https://leetcode.com/problems/find-k-pairs-w
ith-smallest-sums   "You are given two integer arrays nums1 and nums2 sorted in asce
nding order and an integer k.

Define a pair (u,v) which consists of one element from the first array and one eleme
nt from the second array.

Find the k pairs (u1,v1),(u2,v2) ...(uk,vk) with the smallest sums.

Example 1:

Given nums1 = [1,7,11], nums2 = [2,4,6], k = 3

Return: [1,2],[1,4],[1,6]

The first 3 pairs are returned from the sequence:
[1,2],[1,4],[1,6],[7,2],[7,4],[11,2],[7,6],[11,4],[11,6]

Example 2:

Given nums1 = [1,1,2], nums2 = [1,2,3], k = 2

Return: [1,1],[1,1]

The first 2 pairs are returned from the sequence:
[1,1],[1,1],[1,2],[2,1],[1,2],[2,2],[1,3],[1,3],[2,3]

Example 3:

Given nums1 = [1,2], nums2 = [3], k = 3

Return: [1,3],[2,3]

All possible pairs are returned from the sequence:
[1,3],[2,3]

Credits:

Special thanks to @elmirap and @StefanPochmann for adding this problem and creating all test cases."¿
374. Guess Number Higher or Lower https://leetcode.com/problems/guess-number-highe r-or-lower "We are playing the Guess Game. The game is as follows:

I pick a number from 1 to n. You have to guess which number I picked.

Every time you guess wrong, I'll tell you whether the number is higher or lower.

You call a pre-defined API guess(int num) which returns 3 possible results (-1, 1, o r 0):
-1 : My number is lower
 1 : My number is higher
 0 : Congrats! You got it!

Example:

n = 10, I pick 6.

Return 6."¿
375. Guess Number Higher or Lower II https://leetcode.com/problems/guess-number-h igher-or-lower-ii "We are playing the Guess Game. The game is as follows:

I pick a number from 1 to n. You have to guess which number I picked.

Every time you guess wrong, I'll tell you whether the number I picked is higher or l ower.

However, when you guess a particular number x, and you guess wrong, you pay $x. You win the game when you guess the number I picked.

Example:
n = 10, I pick 8.

First round: You guess 5, I tell you that it's higher. You pay $5.
Second round: You guess 7, I tell you that it's higher. You pay $7.
Third round: You guess 9, I tell you that it's lower. You pay $9.

Game over. 8 is the number I picked.

You end up paying $5 + $7 + $9 = $21.

Given a particular n ¿ 1, find out how much money you need to have to guarantee a wi n.

Credits:
Special thanks to @agave and @StefanPochmann for adding this problem and creating al l test cases."¿
376. Wiggle Subsequence https://leetcode.com/problems/wiggle-subsequence "A seque nce of numbers is called a wiggle sequence if the differences between successive num bers strictly alternate between positive and negative. The first difference (if one exists) may be either positive or negative. A sequence with fewer than two elements is trivially a wiggle sequence.

For example, [1,7,4,9,2,5] is a wiggle sequence because the differences (6,-3,5,-7,3) are alternately positive and negative. In contrast, [1,4,7,2,5] and [1,7,4,5,5] ar e not wiggle sequences, the first because its first two differences are positive and the second because its last difference is zero.

Given a sequence of integers, return the length of the longest subsequence that is a wiggle sequence. A subsequence is obtained by deleting some number of elements (eve ntually, also zero) from the original sequence, leaving the remaining elements in th eir original order.

Examples:

Input: [1,7,4,9,2,5]
Output: 6
The entire sequence is a wiggle sequence.

Input: [1,17,5,10,13,15,10,5,16,8]
Output: 7
There are several subsequences that achieve this length. One is [1,17,10,13,10,16,8]
.

Input: [1,2,3,4,5,6,7,8,9]
Output: 2

Follow up:

Can you do it in O(n) time?

Credits:
Special thanks to @agave and @StefanPochmann for adding this problem and creating al
l test cases."¿
377. Combination Sum IV https://leetcode.com/problems/combination-sum-iv "Given a
n integer array with all positive numbers and no duplicates, find the number of poss
ible combinations that add up to a positive integer target.

Example:
nums = [1, 2, 3]
target = 4

The possible combination ways are:
(1, 1, 1, 1)
(1, 1, 2)
(1, 2, 1)
(1, 3)
(2, 1, 1)
(2, 2)
(3, 1)

Note that different sequences are counted as different combinations.

Therefore the output is 7.

Follow up:

What if negative numbers are allowed in the given array?

How does it change the problem?

What limitation we need to add to the question to allow negative numbers?

Credits:
Special thanks to @pbrother for adding this problem and creating all test cases."¿
378. Kth Smallest Element in a Sorted Matrix https://leetcode.com/problems/kth-sm
allest-element-in-a-sorted-matrix "Given a n x n matrix where each of the rows and
columns are sorted in ascending order, find the kth smallest element in the matrix.

Note that it is the kth smallest element in the sorted order, not the kth distinct e
lement.

Example:
matrix = [
   [1, 5, 9],
   [10, 11, 13],
   [12, 13, 15]
],
k = 8,

return 13.

Note:

You may assume k is always valid, 1 ¿ k ¿ n2."¿
380. Insert Delete GetRandom O(1) https://leetcode.com/problems/insert-delete-getrandom-o1 "Design a data structure that supports all following operations in average O(1) time.

insert(val): Inserts an item val to the set if not already present.
remove(val): Removes an item val from the set if present.
getRandom: Returns a random element from current set of elements. Each element must have the same probability of being returned.

Example:
// Init an empty set.
RandomizedSet randomSet = new RandomizedSet();

// Inserts 1 to the set. Returns true as 1 was inserted successfully.
randomSet.insert(1);

// Returns false as 2 does not exist in the set.
randomSet.remove(2);

// Inserts 2 to the set, returns true. Set now contains [1,2].
randomSet.insert(2);

// getRandom should return either 1 or 2 randomly.
randomSet.getRandom();

// Removes 1 from the set, returns true. Set now contains [2].
randomSet.remove(1);

// 2 was already in the set, so return false.
randomSet.insert(2);

// Since 2 is the only number in the set, getRandom always return 2.
randomSet.getRandom();"¿
381. Insert Delete GetRandom O(1) - Duplicates allowed https://leetcode.com/problems/insert-delete-getrandom-o1-duplicates-allowed "Design a data structure that supports all following operations in average O(1) time.
Note: Duplicate elements are allowed.

insert(val): Inserts an item val to the collection.
remove(val): Removes an item val from the collection if present.
getRandom: Returns a random element from current collection of elements. The probability of each element being returned is linearly related to the number of same value the collection contains.

Example:
// Init an empty collection.
RandomizedCollection collection = new RandomizedCollection();

// Inserts 1 to the collection. Returns true as the collection did not contain 1.
collection.insert(1);

// Inserts another 1 to the collection. Returns false as the collection contained 1. Collection now contains [1,1].
collection.insert(1);

// Inserts 2 to the collection, returns true. Collection now contains [1,1,2].
collection.insert(2);

// getRandom should return 1 with the probability 2/3, and returns 2 with the probability 1/3.
collection.getRandom();

// Removes 1 from the collection, returns true. Collection now contains [1,2].

collection.remove(1);

// getRandom should return 1 and 2 both equally likely.
collection.getRandom();"¿
382. Linked List Random Node https://leetcode.com/problems/linked-list-random-node "Given a singly linked list, return a random node's value from the linked list. Each node must have the same probability of being chosen.

Follow up:

What if the linked list is extremely large and its length is unknown to you? Could you solve this efficiently without using extra space?

Example:
// Init a singly linked list [1,2,3].
ListNode head = new ListNode(1);
head.next = new ListNode(2);
head.next.next = new ListNode(3);
Solution solution = new Solution(head);

// getRandom() should return either 1, 2, or 3 randomly. Each element should have equal probability of returning.
solution.getRandom();"¿
383. Ransom Note https://leetcode.com/problems/ransom-note "Given an arbitrary ransom note string and another string containing letters from all the magazines, write a function that will return true if the ransom
note can be constructed from the magazines ; otherwise, it will return false.

Each letter in the magazine string can only be used once in your ransom note.

Note:

You may assume that both strings contain only lowercase letters.

canConstruct(""a"", ""b"") -> false
canConstruct(""aa"", ""ab"") -> false
canConstruct(""aa"", ""aab"") -> true"¿
384. Shuffle an Array https://leetcode.com/problems/shuffle-an-array "Shuffle a set of numbers without duplicates.

Example:
// Init an array with set 1, 2, and 3.
int[] nums = {1,2,3};
Solution solution = new Solution(nums);

// Shuffle the array [1,2,3] and return its result. Any permutation of [1,2,3] must equally likely to be returned.
solution.shuffle();

// Resets the array back to its original configuration [1,2,3].
solution.reset();

// Returns the random shuffling of array [1,2,3].
solution.shuffle();"¿
385. Mini Parser https://leetcode.com/problems/mini-parser "Given a nested list of integers represented as a string, implement a parser to deserialize it.

Each element is either an integer, or a list -- whose elements may also be integers or other lists.

Note:
You may assume that the string is well-formed:

String is non-empty.
String does not contain white spaces.
String contains only digits 0-9, [, - ,,].

```
Example 1:
Given s = ""324"",

You should return a NestedInteger object which contains a single integer 324.



Example 2:
Given s = ""[123,[456,[789]]]"",

Return a NestedInteger object containing a nested list with 2 elements:

1. An integer containing value 123.
2. A nested list containing two elements:
    i.  An integer containing value 456.
    ii. A nested list with one element:
         a. An integer containing value 789."¿
386. Lexicographical Numbers    https://leetcode.com/problems/lexicographical-number
s   "Given an integer n, return 1 - n in lexicographical order.



For example, given 13, return: [1,10,11,12,13,2,3,4,5,6,7,8,9].



Please optimize your algorithm to use less time and space. The input size may be as
large as 5,000,000."¿
387. First Unique Character in a String https://leetcode.com/problems/first-unique-c
haracter-in-a-string    "Given a string, find the first non-repeating character in i
t and return it's index. If it doesn't exist, return -1.

Examples:
s = ""leetcode""
return 0.

s = ""loveleetcode"",
return 2.




Note: You may assume the string contain only lowercase letters."¿
388. Longest Absolute File Path https://leetcode.com/problems/longest-absolute-file-
path    "Suppose we abstract our file system by a string in the following manner:

The string ""dir\n\tsubdir1\n\tsubdir2\n\t\tfile.ext"" represents:

dir
    subdir1
    subdir2
        file.ext


The directory dir contains an empty sub-directory subdir1 and a sub-directory subdir
2 containing a file file.ext.

The string ""dir\n\tsubdir1\n\t\tfile1.ext\n\t\tsubsubdir1\n\tsubdir2\n\t\tsubsubdir
2\n\t\t\tfile2.ext"" represents:

dir
    subdir1
        file1.ext
        subsubdir1
    subdir2
        subsubdir2
            file2.ext


The directory dir contains two sub-directories subdir1 and subdir2. subdir1 contains
 a file file1.ext and an empty second-level sub-directory subsubdir1. subdir2 contai
ns a second-level sub-directory subsubdir2 containing a file file2.ext.
```

We are interested in finding the longest (number of characters) absolute path to a f
ile within our file system. For example, in the second example above, the longest ab
solute path is ""dir/subdir2/subsubdir2/file2.ext"", and its length is 32 (not inclu
ding the double quotes).

Given a string representing the file system in the above format, return the length o
f the longest absolute path to file in the abstracted file system. If there is no fi
le in the system, return 0.

Note:

The name of a file contains at least a . and an extension.
The name of a directory or sub-directory will not contain a ..

Time complexity required: O(n) where n is the size of the input string.

Notice that a/aa/aaa/file1.txt is not the longest file path, if there is another pat
h aaaaaaaaaaaaaaaaaaaaa/sth.png."¿
389. Find the Difference https://leetcode.com/problems/find-the-difference "Giv
en two strings s and t which consist of only lowercase letters.

String t is generated by random shuffling string s and then add one more letter at a
 random position.

Find the letter that was added in t.

Example:
Input:
s = ""abcd""
t = ""abcde""

Output:
e

Explanation:
'e' is the letter that was added."¿
390. Elimination Game https://leetcode.com/problems/elimination-game "There is a
list of sorted integers from 1 to n. Starting from left to right, remove the first n
umber and every other number afterward until you reach the end of the list.

Repeat the previous step again, but this time from right to left, remove the right m
ost number and every other number from the remaining numbers.

We keep repeating the steps again, alternating left to right and right to left, unti
l a single number remains.

Find the last number that remains starting with a list of length n.

Example:
Input:
n = 9,
1 2 3 4 5 6 7 8 9
2 4 6 8
2 6
6

Output:
6"¿
391. Perfect Rectangle https://leetcode.com/problems/perfect-rectangle ¿
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391. Perfect Rectangle https://leetcode.com/problems/perfect-rectangle "Given N axi
s-aligned rectangles where N > 0, determine if they all together form an exact cover
 of a rectangular region.

Each rectangle is represented as a bottom-left point and a top-right point. For exam
ple, a unit square is represented as [1,1,2,2]. (coordinate of bottom-left point is

(1, 1) and top-right point is (2, 2)).

Example 1:
rectangles = [
  [1,1,3,3],
  [3,1,4,2],
  [3,2,4,4],
  [1,3,2,4],
  [2,3,3,4]
]

Return true. All 5 rectangles together form an exact cover of a rectangular region.

Example 2:
rectangles = [
  [1,1,2,3],
  [1,3,2,4],
  [3,1,4,2],
  [3,2,4,4]
]

Return false. Because there is a gap between the two rectangular regions.

Example 3:
rectangles = [
  [1,1,3,3],
  [3,1,4,2],
  [1,3,2,4],
  [3,2,4,4]
]

Return false. Because there is a gap in the top center.

Example 4:
rectangles = [
  [1,1,3,3],
  [3,1,4,2],
  [1,3,2,4],
  [2,2,4,4]
]

Return false. Because two of the rectangles overlap with each other."¿
391. Perfect Rectangle https://leetcode.com/problems/perfect-rectangle ¿
391. Perfect Rectangle https://leetcode.com/problems/perfect-rectangle ¿
391. Perfect Rectangle https://leetcode.com/problems/perfect-rectangle ¿
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391. Perfect Rectangle https://leetcode.com/problems/perfect-rectangle ¿
392. Is Subsequence https://leetcode.com/problems/is-subsequence   "Given a string s and a string t, check if s is subsequence of t.

You may assume that there is only lower case English letters in both s and t. t is potentially a very long (length ~= 500,000) string, and s is a short string (<=100).

A subsequence of a string is a new string which is formed from the original string b
y deleting some (can be none) of the characters without disturbing the relative posi
tions of the remaining characters. (ie, ""ace"" is a subsequence of ""abcde"" while
""aec"" is not).

Example 1:

s = ""abc"", t = ""ahbgdc""

Return true.

Example 2:

s = ""axc"", t = ""ahbgdc""

Return false.

Follow up:

If there are lots of incoming S, say S1, S2, ... , Sk where k >= 1B, and you want to
 check one by one to see if T has its subsequence. In this scenario, how would you c
hange your code?

Credits:
Special thanks to @pbrother for adding this problem and creating all test cases."¿
393. UTF-8 Validation https://leetcode.com/problems/utf-8-validation "A character
 in UTF8 can be from 1 to 4 bytes long, subjected to the following rules:

For 1-byte character, the first bit is a 0, followed by its unicode code.
For n-bytes character, the first n-bits are all one's, the n+1 bit is 0, followed by
 n-1 bytes with most significant 2 bits being 10.

This is how the UTF-8 encoding would work:

Char. number range (hexadecimal)	UTF-8 octet sequence (binary)
0000 0000-0000 007F	0xxxxxxx
0000 0080-0000 07FF	110xxxxx 10xxxxxx
0000 0800-0000 FFFF	1110xxxx 10xxxxxx 10xxxxxx
0001 0000-0010 FFFF	11110xxx 10xxxxxx 10xxxxxx 10xxxxxx

Given an array of integers representing the data, return whether it is a valid utf-8
 encoding.

Note:

The input is an array of integers. Only the least significant 8 bits of each integer
 is used to store the data. This means each integer represents only 1 byte of data.

Example 1:
data = [197, 130, 1], which represents the octet sequence: 11000101 10000010 0000000
1.

Return true.
It is a valid utf-8 encoding for a 2-bytes character followed by a 1-byte character.

Example 2:
data = [235, 140, 4], which represented the octet sequence: 11101011 10001100 000001
00.

Return false.
The first 3 bits are all one's and the 4th bit is 0 means it is a 3-bytes character.
The next byte is a continuation byte which starts with 10 and that's correct.
But the second continuation byte does not start with 10, so it is invalid."¿
394. Decode String https://leetcode.com/problems/decode-string "Given an encoded st
ring, return it's decoded string.

The encoding rule is: k[encoded_string], where the encoded_string inside the square
brackets is being repeated exactly k times. Note that k is guaranteed to be a positi
ve integer.

You may assume that the input string is always valid; No extra white spaces, square
brackets are well-formed, etc.

Furthermore, you may assume that the original data does not contain any digits and t
hat digits are only for those repeat numbers, k. For example, there won't be input l
ike 3a or 2[4].

Examples:
s = ""3[a]2[bc]"", return ""aaabcbc"".
s = ""3[a2[c]]"", return ""accaccacc"".
s = ""2[abc]3[cd]ef"", return ""abcabccdcdcdef"".¿
395. Longest Substring with At Least K Repeating Characters https://leetcode.com/pro
blems/longest-substring-with-at-least-k-repeating-characters   "Find the length of
the longest substring T of a given string (consists of lowercase letters only) such
that every character in T appears no less than k times.

Example 1:
Input:
s = ""aaabb"", k = 3

Output:
3

The longest substring is ""aaa"", as 'a' is repeated 3 times.

Example 2:
Input:
s = ""ababbc"", k = 2

Output:
5

The longest substring is ""ababb"", as 'a' is repeated 2 times and 'b' is repeated 3
 times."¿
396. Rotate Function   https://leetcode.com/problems/rotate-function   "Given an ar
ray of integers A and let n to be its length.

Assume Bk to be an array obtained by rotating the array A k positions clock-wise, we
 define a ""rotation function"" F on A as follow:

F(k) = 0 * Bk[0] + 1 * Bk[1] + ... + (n-1) * Bk[n-1].

Calculate the maximum value of F(0), F(1), ..., F(n-1).

Note:

n is guaranteed to be less than 105.

Example:

A = [4, 3, 2, 6]

F(0) = (0 * 4) + (1 * 3) + (2 * 2) + (3 * 6) = 0 + 3 + 4 + 18 = 25
F(1) = (0 * 6) + (1 * 4) + (2 * 3) + (3 * 2) = 0 + 4 + 6 + 6 = 16
F(2) = (0 * 2) + (1 * 6) + (2 * 4) + (3 * 3) = 0 + 6 + 8 + 9 = 23
F(3) = (0 * 3) + (1 * 2) + (2 * 6) + (3 * 4) = 0 + 2 + 12 + 12 = 26

So the maximum value of F(0), F(1), F(2), F(3) is F(3) = 26."¿
397. Integer Replacement https://leetcode.com/problems/integer-replacement "Given a positive integer n and you can do operations as follow:

If n is even, replace n with n/2.
If n is odd, you can replace n with either n + 1 or n - 1.

What is the minimum number of replacements needed for n to become 1?

Example 1:
Input:
8

Output:
3

Explanation:
8 -> 4 -> 2 -> 1

Example 2:
Input:
7

Output:
4

Explanation:
7 -> 8 -> 4 -> 2 -> 1
or
7 -> 6 -> 3 -> 2 -> 1"¿
398. Random Pick Index https://leetcode.com/problems/random-pick-index "Given an array of integers with possible duplicates, randomly output the index of a given target number. You can assume that the given target number must exist in the array.

Note:

The array size can be very large. Solution that uses too much extra space will not pass the judge.

Example:
int[] nums = new int[] {1,2,3,3,3};
Solution solution = new Solution(nums);

// pick(3) should return either index 2, 3, or 4 randomly. Each index should have equal probability of returning.
solution.pick(3);

// pick(1) should return 0. Since in the array only nums[0] is equal to 1.
solution.pick(1);"¿
399. Evaluate Division https://leetcode.com/problems/evaluate-division "Equations are given in the format A / B = k, where A and B are variables represented as strings, and k is a real number (floating point number). Given some queries, return the an

swers. If the answer does not exist, return -1.0.

Example:

Given a / b = 2.0, b / c = 3.0.
queries are: a / c = ?, b / a = ?, a / e = ?, a / a = ?, x / x = ? .
return [6.0, 0.5, -1.0, 1.0, -1.0].

The input is: vector<pair<string, string>> equations, vector<double>& values, vecto
r<pair<string, string>> queries , where equations.size() == values.size(), and the v
alues are positive. This represents the equations. Return vector<double>.

According to the example above:
equations = [[""a"", ""b""], [""b"", ""c""]],
values = [2.0, 3.0],
queries = [[""a"", ""c""], [""b"", ""a""], [""a"", ""e""], [""a"", ""a""], [""x"",
""x""]].

The input is always valid. You may assume that evaluating the queries will result in
 no division by zero and there is no contradiction."¿
400. Nth Digit https://leetcode.com/problems/nth-digit "Find the nth digit of the i
nfinite integer sequence 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, ...

Note:

n is positive and will fit within the range of a 32-bit signed integer (n < 231).

Example 1:
Input:
3

Output:
3

Example 2:
Input:
11

Output:
0

Explanation:
The 11th digit of the sequence 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, ... is a 0, which
is part of the number 10."¿
401. Binary Watch https://leetcode.com/problems/binary-watch "A binary watch has
4 LEDs on the top which represent the hours (0-11), and the 6 LEDs on the bottom rep
resent the minutes (0-59).
Each LED represents a zero or one, with the least significant bit on the right.

For example, the above binary watch reads ""3:25"".

Given a non-negative integer n which represents the number of LEDs that are currentl
y on, return all possible times the watch could represent.

Example:
Input: n = 1
Return: [""1:00"", ""2:00"", ""4:00"", ""8:00"", ""0:01"", ""0:02"", ""0:04"", ""0:0
8"", ""0:16"", ""0:32""]

Note:

The order of output does not matter.
The hour must not contain a leading zero, for example ""01:00"" is not valid, it sho
uld be ""1:00"".

The minute must be consist of two digits and may contain a leading zero, for example ""10:2"" is not valid, it should be ""10:02""."¿
402. Remove K Digits https://leetcode.com/problems/remove-k-digits "Given a non-negative integer num represented as a string, remove k digits from the number so that the new number is the smallest possible.

Note:

The length of num is less than 10002 and will be ¿ k.
The given num does not contain any leading zero.

Example 1:
Input: num = ""1432219"", k = 3
Output: ""1219""
Explanation: Remove the three digits 4, 3, and 2 to form the new number 1219 which is the smallest.

Example 2:
Input: num = ""10200"", k = 1
Output: ""200""
Explanation: Remove the leading 1 and the number is 200. Note that the output must not contain leading zeroes.

Example 3:
Input: num = ""10"", k = 2
Output: ""0""
Explanation: Remove all the digits from the number and it is left with nothing which is 0."¿
403. Frog Jump https://leetcode.com/problems/frog-jump "A frog is crossing a river. The river is divided into x units and at each unit there may or may not exist a stone. The frog can jump on a stone, but it must not jump into the water.

Given a list of stones' positions (in units) in sorted ascending order, determine if the frog is able to cross the river by landing on the last stone. Initially, the frog is on the first stone and assume the first jump must be 1 unit.

If the frog's last jump was k units, then its next jump must be either k - 1, k, or k + 1 units. Note that the frog can only jump in the forward direction.

Note:

The number of stones is ¿ 2 and is < 1,100.
Each stone's position will be a non-negative integer < 231.
The first stone's position is always 0.

Example 1:
[0,1,3,5,6,8,12,17]

There are a total of 8 stones.
The first stone at the 0th unit, second stone at the 1st unit,
third stone at the 3rd unit, and so on...
The last stone at the 17th unit.

Return true. The frog can jump to the last stone by jumping
1 unit to the 2nd stone, then 2 units to the 3rd stone, then
2 units to the 4th stone, then 3 units to the 6th stone,
4 units to the 7th stone, and 5 units to the 8th stone.

Example 2:

[0,1,2,3,4,8,9,11]

Return false. There is no way to jump to the last stone as
the gap between the 5th and 6th stone is too large."¿
404. Sum of Left Leaves https://leetcode.com/problems/sum-of-left-leaves "Find th
e sum of all left leaves in a given binary tree.

Example:
```
    3
   / \
  9  20
    /  \
   15   7
```

There are two left leaves in the binary tree, with values 9 and 15 respectively. Ret
urn 24."¿
405. Convert a Number to Hexadecimal https://leetcode.com/problems/convert-a-numb
er-to-hexadecimal "Given an integer, write an algorithm to convert it to hexadecim
al. For negative integer, two¿s complement method is used.

Note:

All letters in hexadecimal (a-f) must be in lowercase.
The hexadecimal string must not contain extra leading 0s. If the number is zero, it
is represented by a single zero character '0'; otherwise, the first character in the
 hexadecimal string will not be the zero character.
The given number is guaranteed to fit within the range of a 32-bit signed integer.
You must not use any method provided by the library which converts/formats the numbe
r to hex directly.

Example 1:
Input:
26

Output:
""1a""

Example 2:
Input:
-1

Output:
""ffffffff""¿
406. Queue Reconstruction by Height https://leetcode.com/problems/queue-reconstructi
on-by-height "Suppose you have a random list of people standing in a queue. Each
person is described by a pair of integers (h, k), where h is the height of the perso
n and k is the number of people in front of this person who have a height greater th
an or equal to h. Write an algorithm to reconstruct the queue.

Note:

The number of people is less than 1,100.

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

Output:
[[5,0], [7,0], [5,2], [6,1], [4,4], [7,1]]"¿
407. Trapping Rain Water II https://leetcode.com/problems/trapping-rain-water-ii
"Given an m x n matrix of positive integers representing the height of each unit cel
l in a 2D elevation map, compute the volume of water it is able to trap after rainin
g.

Note:

Both m and n are less than 110. The height of each unit cell is greater than 0 and i
s less than 20,000.

Example:
Given the following 3x6 height map:
[
  [1,4,3,1,3,2],
  [3,2,1,3,2,4],
  [2,3,3,2,3,1]
]

Return 4.

The above image represents the elevation map [[1,4,3,1,3,2],[3,2,1,3,2,4],[2,3,3,2,3
,1]] before the rain.

After the rain, water is trapped between the blocks. The total volume of water trapp
ed is 4."¿
409. Longest Palindrome https://leetcode.com/problems/longest-palindrome "Given a
 string which consists of lowercase or uppercase letters, find the length of the lon
gest palindromes that can be built with those letters.

This is case sensitive, for example ""Aa"" is not considered a palindrome here.

Note:

Assume the length of given string will not exceed 1,010.

Example:
Input:
""abccccdd""

Output:
7

Explanation:
One longest palindrome that can be built is ""dccaccd"", whose length is 7."¿
410. Split Array Largest Sum https://leetcode.com/problems/split-array-largest-su
m "Given an array which consists of non-negative integers and an integer m, you ca
n split the array into m non-empty continuous subarrays. Write an algorithm to minim
ize the largest sum among these m subarrays.

Note:

If n is the length of array, assume the following constraints are satisfied:

1 ¿ n ¿ 1000
1 ¿ m ¿ min(50, n)

Examples:
Input:
nums = [7,2,5,10,8]
m = 2

Output:

18

Explanation:
There are four ways to split nums into two subarrays.
The best way is to split it into [7,2,5] and [10,8],
where the largest sum among the two subarrays is only 18."¿
412. Fizz Buzz https://leetcode.com/problems/fizz-buzz "Write a program that outputs the string representation of numbers from 1 to n.

But for multiples of three it should output ¿Fizz¿ instead of the number and for the multiples of five output ¿Buzz¿. For numbers which are multiples of both three and five output ¿FizzBuzz¿.

Example:
n = 15,

Return:
[
    ""1"",
    ""2"",
    ""Fizz"",
    ""4"",
    ""Buzz"",
    ""Fizz"",
    ""7"",
    ""8"",
    ""Fizz"",
    ""Buzz"",
    ""11"",
    ""Fizz"",
    ""13"",
    ""14"",
    ""FizzBuzz""
]"¿
413. Arithmetic Slices https://leetcode.com/problems/arithmetic-slices "A sequence of number is called arithmetic if it consists of at least three elements and if the difference between any two consecutive elements is the same.

For example, these are arithmetic sequence:
1, 3, 5, 7, 9
7, 7, 7, 7
3, -1, -5, -9

The following sequence is not arithmetic. 1, 1, 2, 5, 7

A zero-indexed array A consisting of N numbers is given. A slice of that array is any pair of integers (P, Q) such that 0 <= P < Q < N.

A slice (P, Q) of array A is called arithmetic if the sequence:

    A[P], A[p + 1], ..., A[Q - 1], A[Q] is arithmetic. In particular, this means that P + 1 < Q.

The function should return the number of arithmetic slices in the array A.

Example:
A = [1, 2, 3, 4]

return: 3, for 3 arithmetic slices in A: [1, 2, 3], [2, 3, 4] and [1, 2, 3, 4] itself."¿
414. Third Maximum Number https://leetcode.com/problems/third-maximum-number "Given a non-empty array of integers, return the third maximum number in this array. If it does not exist, return the maximum number. The time complexity must be in O(n).

Example 1:

Input: [3, 2, 1]

Output: 1

Explanation: The third maximum is 1.

Example 2:

Input: [1, 2]

Output: 2

Explanation: The third maximum does not exist, so the maximum (2) is returned instea
d.

Example 3:

Input: [2, 2, 3, 1]

Output: 1

Explanation: Note that the third maximum here means the third maximum distinct numbe
r.
Both numbers with value 2 are both considered as second maximum."¿
415. Add Strings https://leetcode.com/problems/add-strings "Given two non-negat
ive integers num1 and num2 represented as string, return the sum of num1 and num2.

Note:

The length of both num1 and num2 is < 5100.
Both num1 and num2 contains only digits 0-9.
Both num1 and num2 does not contain any leading zero.
You must not use any built-in BigInteger library or convert the inputs to integer di
rectly."¿
416. Partition Equal Subset Sum https://leetcode.com/problems/partition-equal-subset
-sum "Given a non-empty array containing only positive integers, find if the arra
y can be partitioned into two subsets such that the sum of elements in both subsets
is equal.

Note:

Each of the array element will not exceed 100.
The array size will not exceed 200.

Example 1:
Input: [1, 5, 11, 5]

Output: true

Explanation: The array can be partitioned as [1, 5, 5] and [11].

Example 2:
Input: [1, 2, 3, 5]

Output: false

Explanation: The array cannot be partitioned into equal sum subsets."¿
417. Pacific Atlantic Water Flow https://leetcode.com/problems/pacific-atlantic-w
ater-flow "Given an m x n matrix of non-negative integers representing the height
of each unit cell in a continent, the ""Pacific ocean"" touches the left and top edg
es of the matrix and the ""Atlantic ocean"" touches the right and bottom edges.

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

Find the list of grid coordinates where water can flow to both the Pacific and Atlan

tic ocean.

Note:

The order of returned grid coordinates does not matter.
Both m and n are less than 150.

Example:
Given the following 5x5 matrix:

```
  Pacific ~   ~   ~   ~   ~
       ~  1   2   2   3  (5) *
       ~  3   2   3  (4) (4) *
       ~  2   4  (5)  3   1  *
       ~ (6) (7)  1   4   5  *
       ~ (5)  1   1   2   4  *
          *   *   *   *   * Atlantic
```

Return:

[[0, 4], [1, 3], [1, 4], [2, 2], [3, 0], [3, 1], [4, 0]] (positions with parentheses in above matrix)."¿
419. Battleships in a Board https://leetcode.com/problems/battleships-in-a-board "Given an 2D board, count how many battleships are in it. The battleships are represented with 'X's, empty slots are represented with '.'s. You may assume the following rules:

You receive a valid board, made of only battleships or empty slots.
Battleships can only be placed horizontally or vertically. In other words, they can only be made of the shape 1xN (1 row, N columns) or Nx1 (N rows, 1 column), where N can be of any size.
At least one horizontal or vertical cell separates between two battleships - there are no adjacent battleships.

Example:

```
X..X
...X
...X
```

In the above board there are 2 battleships.

Invalid Example:

```
...X
XXXX
...X
```

This is an invalid board that you will not receive - as battleships will always have a cell separating between them.

Follow up:
Could you do it in one-pass, using only O(1) extra memory and without modifying the value of the board?"¿
420. Strong Password Checker https://leetcode.com/problems/strong-password-checker "A password is considered strong if below conditions are all met:

It has at least 6 characters and at most 20 characters.
It must contain at least one lowercase letter, at least one uppercase letter, and at least one digit.
It must NOT contain three repeating characters in a row (""...aaa..."" is weak, but ""...aa...a..."" is strong, assuming other conditions are met).

Write a function strongPasswordChecker(s), that takes a string s as input, and return the MINIMUM change required to make s a strong password. If s is already strong, return 0.

Insertion, deletion or replace of any one character are all considered as one change
."¿
421. Maximum XOR of Two Numbers in an Array https://leetcode.com/problems/maximum-xo
r-of-two-numbers-in-an-array "Given a non-empty array of numbers, a0, a1, a2, ¿ ,
an-1, where 0 ¿ ai < 231.

Find the maximum result of ai XOR aj, where 0 ¿ i, j < n.

Could you do this in O(n) runtime?

Example:
Input: [3, 10, 5, 25, 2, 8]

Output: 28

Explanation: The maximum result is 5 ^ 25 = 28."¿
423. Reconstruct Original Digits from English https://leetcode.com/problems/recons
truct-original-digits-from-english "Given a non-empty string containing an out-of-o
rder English representation of digits 0-9, output the digits in ascending order.

Note:

Input contains only lowercase English letters.
Input is guaranteed to be valid and can be transformed to its original digits. That
means invalid inputs such as ""abc"" or ""zerone"" are not permitted.
Input length is less than 50,000.

Example 1:

Input: ""owoztneoer""

Output: ""012""

Example 2:

Input: ""fviefuro""

Output: ""45""""¿
424. Longest Repeating Character Replacement https://leetcode.com/problems/longes
t-repeating-character-replacement "Given a string that consists of only uppercase
English letters, you can replace any letter in the string with another letter at mos
t k times. Find the length of a longest substring containing all repeating letters y
ou can get after performing the above operations.

Note:

Both the string's length and k will not exceed 104.

Example 1:
Input:
s = ""ABAB"", k = 2

Output:
4

Explanation:
Replace the two 'A's with two 'B's or vice versa.

Example 2:
Input:
s = ""AABABBA"", k = 1

Output:

4

Explanation:
Replace the one 'A' in the middle with 'B' and form ""AABBBBA"".
The substring ""BBBB"" has the longest repeating letters, which is 4."¿
432. All O`one Data Structure https://leetcode.com/problems/all-oone-data-structure "Implement a data structure supporting the following operations:

Inc(Key) - Inserts a new key with value 1. Or increments an existing key by 1. Key is guaranteed to be a non-empty string.
Dec(Key) - If Key's value is 1, remove it from the data structure. Otherwise decrements an existing key by 1. If the key does not exist, this function does nothing. Key is guaranteed to be a non-empty string.
GetMaxKey() - Returns one of the keys with maximal value. If no element exists, return an empty string """".
GetMinKey() - Returns one of the keys with minimal value. If no element exists, return an empty string """".

Challenge: Perform all these in O(1) time complexity."¿
433. Minimum Genetic Mutation https://leetcode.com/problems/minimum-genetic-mutation "A gene string can be represented by an 8-character long string, with choices from ""A"", ""C"", ""G"", ""T"".

Suppose we need to investigate about a mutation (mutation from ""start"" to ""end""), where ONE mutation is defined as ONE single character changed in the gene string.

For example, ""AACCGGTT"" -> ""AACCGGTA"" is 1 mutation.

Also, there is a given gene ""bank"", which records all the valid gene mutations. A gene must be in the bank to make it a valid gene string.

Now, given 3 things - start, end, bank, your task is to determine what is the minimum number of mutations needed to mutate from ""start"" to ""end"". If there is no such a mutation, return -1.

Note:

Starting point is assumed to be valid, so it might not be included in the bank.
If multiple mutations are needed, all mutations during in the sequence must be valid.
You may assume start and end string is not the same.

Example 1:
start: ""AACCGGTT""
end: ""AACCGGTA""
bank: [""AACCGGTA""]

return: 1

Example 2:
start: ""AACCGGTT""
end: ""AAACGGTA""
bank: [""AACCGGTA"", ""AACCGCTA"", ""AAACGGTA""]

return: 2

Example 3:
start: ""AAAAACCC""
end: ""AACCCCCC""
bank: [""AAAACCCC"", ""AAACCCCC"", ""AACCCCCC""]

return: 3"¿

434. Number of Segments in a String https://leetcode.com/problems/number-of-segments-in-a-string "Count the number of segments in a string, where a segment is defined to be a contiguous sequence of non-space characters.

Please note that the string does not contain any non-printable characters.

Example:
Input: ""Hello, my name is John""
Output: 5"¿
435. Non-overlapping Intervals https://leetcode.com/problems/non-overlapping-intervals "Given a collection of intervals, find the minimum number of intervals you need to remove to make the rest of the intervals non-overlapping.

Note:

You may assume the interval's end point is always bigger than its start point.
Intervals like [1,2] and [2,3] have borders ""touching"" but they don't overlap each other.

Example 1:

Input: [[1,2], [2,3], [3,4], [1,3]]

Output: 1

Explanation: [1,3] can be removed and the rest of intervals are non-overlapping.

Example 2:

Input: [[1,2], [1,2], [1,2]]

Output: 2

Explanation: You need to remove two [1,2] to make the rest of intervals non-overlapping.

Example 3:

Input: [[1,2], [2,3]]

Output: 0

Explanation: You don't need to remove any of the intervals since they're already non-overlapping."¿
436. Find Right Interval https://leetcode.com/problems/find-right-interval "Given a set of intervals, for each of the interval i, check if there exists an interval j whose start point is bigger than or equal to the end point of the interval i, which can be called that j is on the ""right"" of i.

For any interval i, you need to store the minimum interval j's index, which means that the interval j has the minimum start point to build the ""right"" relationship for interval i. If the interval j doesn't exist, store -1 for the interval i. Finally, you need output the stored value of each interval as an array.

Note:

You may assume the interval's end point is always bigger than its start point.
You may assume none of these intervals have the same start point.

Example 1:

Input: [[1,2]]

Output: [-1]

Explanation: There is only one interval in the collection, so it outputs -1.

Example 2:

Input: [[3,4], [2,3], [1,2]]

Output: [-1, 0, 1]

Explanation: There is no satisfied ""right"" interval for [3,4].
For [2,3], the interval [3,4] has minimum-""right"" start point;
For [1,2], the interval [2,3] has minimum-""right"" start point.

Example 3:

Input: [[1,4], [2,3], [3,4]]

Output: [-1, 2, -1]

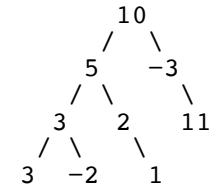
Explanation: There is no satisfied ""right"" interval for [1,4] and [3,4].
For [2,3], the interval [3,4] has minimum-""right"" start point."¿
437. Path Sum III https://leetcode.com/problems/path-sum-iii "You are given a bin
ary tree in which each node contains an integer value.

Find the number of paths that sum to a given value.

The path does not need to start or end at the root or a leaf, but it must go downwar
ds
(traveling only from parent nodes to child nodes).

The tree has no more than 1,000 nodes and the values are in the range -1,000,000 to
1,000,000.

Example:
root = [10,5,-3,3,2,null,11,3,-2,null,1], sum = 8



Return 3. The paths that sum to 8 are:

1. 5 -> 3
2. 5 -> 2 -> 1
3. -3 -> 11"¿
438. Find All Anagrams in a String https://leetcode.com/problems/find-all-anagrams-
in-a-string "Given a string s and a non-empty string p, find all the start indices o
f p's anagrams in s.

Strings consists of lowercase English letters only and the length of both strings s
and p will not be larger than 20,100.

The order of output does not matter.

Example 1:
Input:
s: ""cbaebabacd"" p: ""abc""

Output:
[0, 6]

Explanation:
The substring with start index = 0 is ""cba"", which is an anagram of ""abc"".
The substring with start index = 6 is ""bac"", which is an anagram of ""abc"".

Example 2:
Input:
s: ""abab"" p: ""ab""

Output:
[0, 1, 2]

Explanation:
The substring with start index = 0 is ""ab"", which is an anagram of ""ab"".
The substring with start index = 1 is ""ba"", which is an anagram of ""ab"".
The substring with start index = 2 is ""ab"", which is an anagram of ""ab"".¿
440. K-th Smallest in Lexicographical Order https://leetcode.com/problems/k-th-smallest-in-lexicographical-order "Given integers n and k, find the lexicographically k-th smallest integer in the range from 1 to n.

Note: 1 ¿ k ¿ n ¿ 109.

Example:
Input:
n: 13 k: 2

Output:
10

Explanation:
The lexicographical order is [1, 10, 11, 12, 13, 2, 3, 4, 5, 6, 7, 8, 9], so the second smallest number is 10.¿
441. Arranging Coins https://leetcode.com/problems/arranging-coins "You have a total of n coins that you want to form in a staircase shape, where every k-th row must have exactly k coins.

Given n, find the total number of full staircase rows that can be formed.

n is a non-negative integer and fits within the range of a 32-bit signed integer.

Example 1:
n = 5

The coins can form the following rows:
¤
¤ ¤
¤ ¤

Because the 3rd row is incomplete, we return 2.

Example 2:
n = 8

The coins can form the following rows:
¤
¤ ¤
¤ ¤ ¤
¤ ¤

Because the 4th row is incomplete, we return 3.¿
442. Find All Duplicates in an Array https://leetcode.com/problems/find-all-duplicates-in-an-array "Given an array of integers, 1 ¿ a[i] ¿ n (n = size of array), some elements appear twice and others appear once.

Find all the elements that appear twice in this array.

Could you do it without extra space and in O(n) runtime?

Example:

Input:
[4,3,2,7,8,2,3,1]

Output:
[2,3]"¿
443. String Compression https://leetcode.com/problems/string-compression "Given a n array of characters, compress it in-place.

The length after compression must always be smaller than or equal to the original ar ray.

Every element of the array should be a character (not int) of length 1.

After you are done modifying the input array in-place, return the new length of the array.

Follow up:

Could you solve it using only O(1) extra space?

Example 1:

Input:
[""a"",""a"",""b"",""b"",""c"",""c"",""c""]

Output:
Return 6, and the first 6 characters of the input array should be: [""a"",""2"",""b" ",""2"",""c"",""3""]

Explanation:
""aa"" is replaced by ""a2"". ""bb"" is replaced by ""b2"". ""ccc"" is replaced by " "c3"".

Example 2:

Input:
[""a""]

Output:
Return 1, and the first 1 characters of the input array should be: [""a""]

Explanation:
Nothing is replaced.

Example 3:

Input:
[""a"",""b"",""b"",""b"",""b"",""b"",""b"",""b"",""b"",""b"",""b"",""b"",""b"",""b""]

Output:
Return 4, and the first 4 characters of the input array should be: [""a"",""b"",""1" ",""2""].

Explanation:
Since the character ""a"" does not repeat, it is not compressed. ""bbbbbbbbbbbb"" is replaced by ""b12"".
Notice each digit has it's own entry in the array.

Note:

All characters have an ASCII value in [35, 126].
1 <= len(chars) <= 1000."¿
445. Add Two Numbers II https://leetcode.com/problems/add-two-numbers-ii "You are given two non-empty linked lists representing two non-negative integers. The most significant digit comes first and each of their nodes contain a single digit. Add the two numbers and return it as a linked list.

You may assume the two numbers do not contain any leading zero, except the number 0 itself.

Follow up:

What if you cannot modify the input lists? In other words, reversing the lists is not allowed.

Example:
Input: (7 -> 2 -> 4 -> 3) + (5 -> 6 -> 4)
Output: 7 -> 8 -> 0 -> 7"¿
446. Arithmetic Slices II - Subsequence https://leetcode.com/problems/arithmetic-slices-ii-subsequence "A sequence of numbers is called arithmetic if it consists of at least three elements and if the difference between any two consecutive elements is the same.

For example, these are arithmetic sequences:
1, 3, 5, 7, 9
7, 7, 7, 7
3, -1, -5, -9

The following sequence is not arithmetic. 1, 1, 2, 5, 7

A zero-indexed array A consisting of N numbers is given. A subsequence slice of that array is any sequence of integers (P0, P1, ..., Pk) such that 0 ¿ P0 < P1 < ... < Pk < N.

A subsequence slice (P0, P1, ..., Pk) of array A is called arithmetic if the sequence A[P0], A[P1], ..., A[Pk-1], A[Pk] is arithmetic. In particular, this means that k ¿ 2.

The function should return the number of arithmetic subsequence slices in the array A.

The input contains N integers. Every integer is in the range of -231 and 231-1 and 0 ¿ N ¿ 1000. The output is guaranteed to be less than 231-1.

Example:
Input: [2, 4, 6, 8, 10]

Output: 7

Explanation:
All arithmetic subsequence slices are:
[2,4,6]
[4,6,8]
[6,8,10]
[2,4,6,8]
[4,6,8,10]
[2,4,6,8,10]
[2,6,10]"¿
447. Number of Boomerangs https://leetcode.com/problems/number-of-boomerangs "Given n points in the plane that are all pairwise distinct, a ""boomerang"" is a tuple of points (i, j, k) such that the distance between i and j equals the distance between i and k (the order of the tuple matters).

Find the number of boomerangs. You may assume that n will be at most 500 and coordinates of points are all in the range [-10000, 10000] (inclusive).

Example:

Input:
[[0,0],[1,0],[2,0]]

Output:
2

Explanation:
The two boomerangs are [[1,0],[0,0],[2,0]] and [[1,0],[2,0],[0,0]]"¿
448. Find All Numbers Disappeared in an Array https://leetcode.com/problems/find-all-numbers-disappeared-in-an-array "Given an array of integers where 1 ¿ a[i] ¿ n (n = size of array), some elements appear twice and others appear once.

Find all the elements of [1, n] inclusive that do not appear in this array.

Could you do it without extra space and in O(n) runtime? You may assume the returned list does not count as extra space.

Example:
Input:
[4,3,2,7,8,2,3,1]

Output:
[5,6]"¿
449. Serialize and Deserialize BST https://leetcode.com/problems/serialize-and-deserialize-bst "Serialization is the process of converting a data structure or object into a sequence of bits so that it can be stored in a file or memory buffer, or transmitted across a network connection link to be reconstructed later in the same or another computer environment.

Design an algorithm to serialize and deserialize a binary search tree. There is no restriction on how your serialization/deserialization algorithm should work. You just need to ensure that a binary search tree can be serialized to a string and this string can be deserialized to the original tree structure.

The encoded string should be as compact as possible.

Note: Do not use class member/global/static variables to store states. Your serialize and deserialize algorithms should be stateless."¿
450. Delete Node in a BST https://leetcode.com/problems/delete-node-in-a-bst "Given a root node reference of a BST and a key, delete the node with the given key in the BST. Return the root node reference (possibly updated) of the BST.

Basically, the deletion can be divided into two stages:

Search for a node to remove.
If the node is found, delete the node.

Note: Time complexity should be O(height of tree).

Example:
root = [5,3,6,2,4,null,7]
key = 3

```
    5
   / \
  3   6
 / \   \
2   4   7
```

Given key to delete is 3. So we find the node with value 3 and delete it.

One valid answer is [5,4,6,2,null,null,7], shown in the following BST.

```
    5
   / \
```

```
  4   6
 /     \
2       7
```

Another valid answer is [5,2,6,null,4,null,7].

```
    5
   / \
  2   6
   \   \
    4   7"¿
```

451. Sort Characters By Frequency https://leetcode.com/problems/sort-characters-by-frequency "Given a string, sort it in decreasing order based on the frequency of characters.

Example 1:
Input:
""tree""

Output:
""eert""

Explanation:
'e' appears twice while 'r' and 't' both appear once.
So 'e' must appear before both 'r' and 't'. Therefore ""eetr"" is also a valid answer.

Example 2:
Input:
""cccaaa""

Output:
""cccaaa""

Explanation:
Both 'c' and 'a' appear three times, so ""aaaccc"" is also a valid answer.
Note that ""cacaca"" is incorrect, as the same characters must be together.

Example 3:
Input:
""Aabb""

Output:
""bbAa""

Explanation:
""bbaA"" is also a valid answer, but ""Aabb"" is incorrect.
Note that 'A' and 'a' are treated as two different characters."¿
452. Minimum Number of Arrows to Burst Balloons https://leetcode.com/problems/minimum-number-of-arrows-to-burst-balloons "There are a number of spherical balloons spread in two-dimensional space. For each balloon, provided input is the start and end coordinates of the horizontal diameter. Since it's horizontal, y-coordinates don't matter and hence the x-coordinates of start and end of the diameter suffice. Start is always smaller than end. There will be at most 104 balloons.

An arrow can be shot up exactly vertically from different points along the x-axis. A balloon with xstart and xend bursts by an arrow shot at x if xstart ¿ x ¿ xend. There is no limit to the number of arrows that can be shot. An arrow once shot keeps travelling up infinitely. The problem is to find the minimum number of arrows that must be shot to burst all balloons.

Example:
Input:
[[10,16], [2,8], [1,6], [7,12]]

Output:
2

Explanation:

One way is to shoot one arrow for example at x = 6 (bursting the balloons [2,8] and [1,6]) and another arrow at x = 11 (bursting the other two balloons)."¿
453. Minimum Moves to Equal Array Elements https://leetcode.com/problems/minimum-moves-to-equal-array-elements "Given a non-empty integer array of size n, find the minimum number of moves required to make all array elements equal, where a move is incrementing n - 1 elements by 1.

Example:
Input:
[1,2,3]

Output:
3

Explanation:
Only three moves are needed (remember each move increments two elements):

[1,2,3] => [2,3,3] => [3,4,3] => [4,4,4]"¿
454. 4Sum II https://leetcode.com/problems/4sum-ii "Given four lists A, B, C, D of integer values, compute how many tuples (i, j, k, l) there are such that A[i] + B[j] + C[k] + D[l] is zero.

To make problem a bit easier, all A, B, C, D have same length of N where 0 ¿ N ¿ 500. All integers are in the range of -228 to 228 - 1 and the result is guaranteed to be at most 231 - 1.

Example:
Input:
A = [1, 2]
B = [-2,-1]
C = [-1, 2]
D = [0, 2]

Output:
2

Explanation:
The two tuples are:
1. (0, 0, 0, 1) -> A[0] + B[0] + C[0] + D[1] = 1 + (-2) + (-1) + 2 = 0
2. (1, 1, 0, 0) -> A[1] + B[1] + C[0] + D[0] = 2 + (-1) + (-1) + 0 = 0"¿
455. Assign Cookies https://leetcode.com/problems/assign-cookies "Assume you are an awesome parent and want to give your children some cookies. But, you should give each child at most one cookie. Each child i has a greed factor gi, which is the minimum size of a cookie that the child will be content with; and each cookie j has a size sj. If sj >= gi, we can assign the cookie j to the child i, and the child i will be content. Your goal is to maximize the number of your content children and output the maximum number.

Note:

You may assume the greed factor is always positive.

You cannot assign more than one cookie to one child.

Example 1:

Input: [1,2,3], [1,1]

Output: 1

Explanation: You have 3 children and 2 cookies. The greed factors of 3 children are 1, 2, 3.
And even though you have 2 cookies, since their size is both 1, you could only make the child whose greed factor is 1 content.
You need to output 1.

Example 2:

Input: [1,2], [1,2,3]

Output: 2

Explanation: You have 2 children and 3 cookies. The greed factors of 2 children are 1, 2.
You have 3 cookies and their sizes are big enough to gratify all of the children,
You need to output 2."¿
456. 132 Pattern https://leetcode.com/problems/132-pattern "Given a sequence of n integers a1, a2, ..., an, a 132 pattern is a subsequence ai, aj, ak such that i < j < k and ai < ak < aj. Design an algorithm that takes a list of n numbers as input and checks whether there is a 132 pattern in the list.

Note: n will be less than 15,000.

Example 1:

Input: [1, 2, 3, 4]

Output: False

Explanation: There is no 132 pattern in the sequence.

Example 2:

Input: [3, 1, 4, 2]

Output: True

Explanation: There is a 132 pattern in the sequence: [1, 4, 2].

Example 3:

Input: [-1, 3, 2, 0]

Output: True

Explanation: There are three 132 patterns in the sequence: [-1, 3, 2], [-1, 3, 0] and [-1, 2, 0]."¿
457. Circular Array Loop https://leetcode.com/problems/circular-array-loop "You are given an array of positive and negative integers. If a number n at an index is positive, then move forward n steps. Conversely, if it's negative (-n), move backward n steps. Assume the first element of the array is forward next to the last element, and the last element is backward next to the first element. Determine if there is a loop in this array. A loop starts and ends at a particular index with more than 1 element along the loop. The loop must be ""forward"" or ""backward'.

Example 1:

Given the array [2, -1, 1, 2, 2], there is a loop, from index 0 -> 2 -> 3 -> 0.

Example 2:

Given the array [-1, 2], there is no loop.

Note:

The given array is guaranteed to contain no element ""0"".

Can you do it in O(n) time complexity and O(1) space complexity?"¿
458. Poor Pigs https://leetcode.com/problems/poor-pigs "There are 1000 buckets, one and only one of them contains poison, the rest are filled with water. They all look the same. If a pig drinks that poison it will die within 15 minutes. What is the minimum amount of pigs you need to figure out which bucket contains the poison within one hour.

Answer this question, and write an algorithm for the follow-up general case.

Follow-up:

If there are n buckets and a pig drinking poison will die within m minutes, how many pigs (x) you need to figure out the ""poison"" bucket within p minutes? There is exact one bucket with poison."¿
459. Repeated Substring Pattern https://leetcode.com/problems/repeated-substring-pattern "Given a non-empty string check if it can be constructed by taking a substring of it and appending multiple copies of the substring together. You may assume the given string consists of lowercase English letters only and its length will not exceed 10000.

Example 1:

Input: ""abab""

Output: True

Explanation: It's the substring ""ab"" twice.

Example 2:

Input: ""aba""

Output: False

Example 3:

Input: ""abcabcabcabc""

Output: True

Explanation: It's the substring ""abc"" four times. (And the substring ""abcabc"" twice.)"¿
460. LFU Cache https://leetcode.com/problems/lfu-cache "Design and implement a data structure for Least Frequently Used (LFU) cache. It should support the following operations: get and put.

get(key) - Get the value (will always be positive) of the key if the key exists in the cache, otherwise return -1.

put(key, value) - Set or insert the value if the key is not already present. When the cache reaches its capacity, it should invalidate the least frequently used item before inserting a new item. For the purpose of this problem, when there is a tie (i.e., two or more keys that have the same frequency), the least recently used key would be evicted.

Follow up:

Could you do both operations in O(1) time complexity?

Example:
```
LFUCache cache = new LFUCache( 2 /* capacity */ );

cache.put(1, 1);
cache.put(2, 2);
cache.get(1);       // returns 1
cache.put(3, 3);    // evicts key 2
cache.get(2);       // returns -1 (not found)
```

```
cache.get(3);       // returns 3.
cache.put(4, 4);    // evicts key 1.
cache.get(1);       // returns -1 (not found)
cache.get(3);       // returns 3
cache.get(4);       // returns 4"¿
```

461. Hamming Distance https://leetcode.com/problems/hamming-distance "The Hamming distance between two integers is the number of positions at which the corresponding bits are different.

Given two integers x and y, calculate the Hamming distance.

Note:

0 ¿ x, y < 231.

Example:
Input: x = 1, y = 4

Output: 2

Explanation:
1 (0 0 0 1)
4 (0 1 0 0)
¿ ¿

The above arrows point to positions where the corresponding bits are different."¿

462. Minimum Moves to Equal Array Elements II https://leetcode.com/problems/minimum-moves-to-equal-array-elements-ii "Given a non-empty integer array, find the minimum number of moves required to make all array elements equal, where a move is incrementing a selected element by 1 or decrementing a selected element by 1.

You may assume the array's length is at most 10,000.

Example:
Input:
[1,2,3]

Output:
2

Explanation:
Only two moves are needed (remember each move increments or decrements one element):

[1,2,3] => [2,2,3] => [2,2,2]"¿

463. Island Perimeter https://leetcode.com/problems/island-perimeter "You are given a map in form of a two-dimensional integer grid where 1 represents land and 0 represents water. Grid cells are connected horizontally/vertically (not diagonally). The grid is completely surrounded by water, and there is exactly one island (i.e., one or more connected land cells). The island doesn't have ""lakes"" (water inside that isn't connected to the water around the island). One cell is a square with side length 1. The grid is rectangular, width and height don't exceed 100. Determine the perimeter of the island.

Example:
[[0,1,0,0],
[1,1,1,0],
[0,1,0,0],
[1,1,0,0]]

Answer: 16
Explanation: The perimeter is the 16 yellow stripes in the image below:"¿

464. Can I Win https://leetcode.com/problems/can-i-win "In the ""100 game,"" two players take turns adding, to a running total, any integer from 1..10. The player who first causes the running total to reach or exceed 100 wins.

What if we change the game so that players cannot re-use integers?

For example, two players might take turns drawing from a common pool of numbers of 1..15 without replacement until they reach a total >= 100.

Given an integer maxChoosableInteger and another integer desiredTotal, determine if the first player to move can force a win, assuming both players play optimally.

You can always assume that maxChoosableInteger will not be larger than 20 and desire
dTotal will not be larger than 300.

Example
Input:
maxChoosableInteger = 10
desiredTotal = 11

Output:
false

Explanation:
No matter which integer the first player choose, the first player will lose.
The first player can choose an integer from 1 up to 10.
If the first player choose 1, the second player can only choose integers from 2 up t
o 10.
The second player will win by choosing 10 and get a total = 11, which is >= desiredT
otal.
Same with other integers chosen by the first player, the second player will always w
in."¿
466. Count The Repetitions https://leetcode.com/problems/count-the-repetitions "Def
ine S = [s,n] as the string S which consists of n connected strings s. For example,
[""abc"", 3] =""abcabcabc"".
On the other hand, we define that string s1 can be obtained from string s2 if we can
 remove some characters from s2 such that it becomes s1. For example, ¿abc¿ can be
obtained from ¿abdbec¿ based on our definition, but it can not be obtained from ¿acb
be¿.
You are given two non-empty strings s1 and s2 (each at most 100 characters long) and
 two integers 0 ¿ n1 ¿ 106 and 1 ¿ n2 ¿ 106. Now consider the strings S1 and S2, whe
re S1=[s1,n1] and S2=[s2,n2]. Find the maximum integer M such that [S2,M] can be obt
ained from S1.

Example:
Input:
s1=""acb"", n1=4
s2=""ab"", n2=2

Return:
2"¿
467. Unique Substrings in Wraparound String https://leetcode.com/problems/unique-sub
strings-in-wraparound-string   "Consider the string s to be the infinite wraparound
 string of ""abcdefghijklmnopqrstuvwxyz"", so s will look like this: ""...zabcdefghi
jklmnopqrstuvwxyzabcdefghijklmnopqrstuvwxyzabcd....."".

Now we have another string p. Your job is to find out how many unique non-empty subs
trings of p are present in s. In particular, your input is the string p and you need
 to output the number of different non-empty substrings of p in the string s.

Note: p consists of only lowercase English letters and the size of p might be over 1
0000.

Example 1:

Input: ""a""
Output: 1

Explanation: Only the substring ""a"" of string ""a"" is in the string ¿s.

Example 2:

Input: ""cac""
Output: 2
Explanation: There are two substrings ""a"", ""c"" of string ""cac"" in the string s
.

Example 3:

Input: ""zab""
Output: 6
Explanation: There are six substrings ""z"", ""a"", ""b"", ""za"", ""ab"", ""zab"" of string ""zab"" in the string s."¿
468. Validate IP Address https://leetcode.com/problems/validate-ip-address "Write a function to check whether an input string is a valid IPv4 address or IPv6 address or neither.

IPv4 addresses are canonically represented in dot-decimal notation, which consists of four decimal numbers, each ranging from 0 to 255, separated by dots (""."), e.g., 172.16.254.1;

Besides, leading zeros in the IPv4 is invalid. For example, the address 172.16.254.01 is invalid.

IPv6 addresses are represented as eight groups of four hexadecimal digits, each group representing 16 bits. The groups are separated by colons (""":""). For example, the address 2001:0db8:85a3:0000:0000:8a2e:0370:7334 is a valid one. Also, we could omit some leading zeros among four hexadecimal digits and some low-case characters in the address to upper-case ones, so 2001:db8:85a3:0:0:8A2E:0370:7334 is also a valid IPv6 address(Omit leading zeros and using upper cases).

However, we don't replace a consecutive group of zero value with a single empty group using two consecutive colons (::) to pursue simplicity. For example, 2001:0db8:85a3::8A2E:0370:7334 is an invalid IPv6 address.

Besides, extra leading zeros in the IPv6 is also invalid. For example, the address 02001:0db8:85a3:0000:0000:8a2e:0370:7334 is invalid.

Note:
You may assume there is no extra space or special characters in the input string.

Example 1:

Input: ""172.16.254.1""

Output: ""IPv4""

Explanation: This is a valid IPv4 address, return ""IPv4"".

Example 2:

Input: ""2001:0db8:85a3:0:0:8A2E:0370:7334""

Output: ""IPv6""

Explanation: This is a valid IPv6 address, return ""IPv6"".

Example 3:

Input: ""256.256.256.256""

Output: ""Neither""

Explanation: This is neither a IPv4 address nor a IPv6 address."¿
472. Concatenated Words https://leetcode.com/problems/concatenated-words "Given a list of words (without duplicates), please write a program that returns all concatenated words in the given list of words.
A concatenated word is defined as a string that is comprised entirely of at least two shorter words in the given array.

Example:

Input: [""cat"",""cats"",""catsdogcats"",""dog"",""dogcatsdog"",""hippopotamuses"",""rat"",""ratcatdogcat""]

Output: [""catsdogcats"",""dogcatsdog"",""ratcatdogcat""]

Explanation: ""catsdogcats"" can be concatenated by ""cats"", ""dog"" and ""cats"";
""dogcatsdog"" can be concatenated by ""dog"", ""cats"" and ""dog"";
""ratcatdogcat"" can be concatenated by ""rat"", ""cat"", ""dog"" and ""cat"".

Note:

The number of elements of the given array will not exceed 10,000
The length sum of elements in the given array will not exceed 600,000.
All the input string will only include lower case letters.
The returned elements order does not matter."¿
473. Matchsticks to Square https://leetcode.com/problems/matchsticks-to-square "Remember the story of Little Match Girl? By now, you know exactly what matchsticks the little match girl has, please find out a way you can make one square by using up all those matchsticks. You should not break any stick, but you can link them up, and each matchstick must be used exactly one time.

Your input will be several matchsticks the girl has, represented with their stick length. Your output will either be true or false, to represent whether you could make one square using all the matchsticks the little match girl has.

Example 1:

Input: [1,1,2,2,2]
Output: true

Explanation: You can form a square with length 2, one side of the square came two sticks with length 1.

Example 2:

Input: [3,3,3,3,4]
Output: false

Explanation: You cannot find a way to form a square with all the matchsticks.

Note:

The length sum of the given matchsticks is in the range of 0 to 10^9.
The length of the given matchstick array will not exceed 15."¿
474. Ones and Zeroes https://leetcode.com/problems/ones-and-zeroes "In the computer world, use restricted resource you have to generate maximum benefit is what we always want to pursue.
For now, suppose you are a dominator of m 0s and n 1s respectively. On the other hand, there is an array with strings consisting of only 0s and 1s.

Now your task is to find the maximum number of strings that you can form with given m 0s and n 1s. Each 0 and 1 can be used at most once.

Note:

The given numbers of 0s and 1s will both not exceed 100
The size of given string array won't exceed 600.

Example 1:

Input: Array = {""10"", ""0001"", ""111001"", ""1"", ""0""}, m = 5, n = 3
Output: 4

Explanation: This are totally 4 strings can be formed by the using of 5 0s and 3 1s, which are ¿10,¿0001¿,¿1¿,¿0¿

Example 2:

Input: Array = {""10"", ""0"", ""1""}, m = 1, n = 1
Output: 2

Explanation: You could form ""10"", but then you'd have nothing left. Better form ""0"" and ""1""."¿
475. Heaters https://leetcode.com/problems/heaters "Winter is coming! Your first job during the contest is to design a standard heater with fixed warm radius to warm all the houses.

Now, you are given positions of houses and heaters on a horizontal line, find out minimum radius of heaters so that all houses could be covered by those heaters.

So, your input will be the positions of houses and heaters seperately, and your expected output will be the minimum radius standard of heaters.

Note:

Numbers of houses and heaters you are given are non-negative and will not exceed 25000.
Positions of houses and heaters you are given are non-negative and will not exceed 10^9.
As long as a house is in the heaters' warm radius range, it can be warmed.
All the heaters follow your radius standard and the warm radius will the same.

Example 1:

Input: [1,2,3],[2]
Output: 1
Explanation: The only heater was placed in the position 2, and if we use the radius 1 standard, then all the houses can be warmed.

Example 2:

Input: [1,2,3,4],[1,4]
Output: 1
Explanation: The two heater was placed in the position 1 and 4. We need to use radius 1 standard, then all the houses can be warmed."¿
476. Number Complement https://leetcode.com/problems/number-complement "Given a positive integer, output its complement number. The complement strategy is to flip the bits of its binary representation.

Note:

The given integer is guaranteed to fit within the range of a 32-bit signed integer.
You could assume no leading zero bit in the integer¿s binary representation.

Example 1:

Input: 5
Output: 2
Explanation: The binary representation of 5 is 101 (no leading zero bits), and its c
omplement is 010. So you need to output 2.

Example 2:

Input: 1
Output: 0
Explanation: The binary representation of 1 is 1 (no leading zero bits), and its com
plement is 0. So you need to output 0."¿
477. Total Hamming Distance https://leetcode.com/problems/total-hamming-distance
"The Hamming distance between two integers is the number of positions at which the c
orresponding bits are different.

Now your job is to find the total Hamming distance between all pairs of the given nu
mbers.

Example:

Input: 4, 14, 2

Output: 6

Explanation: In binary representation, the 4 is 0100, 14 is 1110, and 2 is 0010 (jus
t
showing the four bits relevant in this case). So the answer will be:
HammingDistance(4, 14) + HammingDistance(4, 2) + HammingDistance(14, 2) = 2 + 2 + 2
= 6.

Note:

Elements of the given array are in the range of 0 to 10^9
Length of the array will not exceed 10^4."¿
479. Largest Palindrome Product https://leetcode.com/problems/largest-palindrome-pro
duct   "Find the largest palindrome made from the product of two n-digit numbers.
 Since the result could be very large, you should return the largest palindrome mod
1337.

Example:
Input: 2
Output: 987
Explanation: 99 x 91 = 9009, 9009 % 1337 = 987

Note:
The range of n is [1,8]."¿
480. Sliding Window Median https://leetcode.com/problems/sliding-window-median "Med
ian is the middle value in an ordered integer list. If the size of the list is even,
 there is no middle value. So the median is the mean of the two middle value.
Examples:

[2,3,4] , the median is 3
[2,3], the median is (2 + 3) / 2 = 2.5

Given an array nums, there is a sliding window of size k which is moving from the ve
ry 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. Your job is to output th
e median array for each window in the original array.

For example,

Given nums = [1,3,-1,-3,5,3,6,7], and k = 3.

```
Window position                Median
---------------                -----
[1  3  -1] -3  5  3  6  7       1
 1 [3  -1  -3] 5  3  6  7       -1
 1  3 [-1  -3  5] 3  6  7       -1
 1  3  -1 [-3  5  3] 6  7       3
 1  3  -1  -3 [5  3  6] 7       5
 1  3  -1  -3  5 [3  6  7]      6
```

Therefore, return the median sliding window as [1,-1,-1,3,5,6].

Note:

You may assume k is always valid, ie: k is always smaller than input array's size fo r non-empty array."¿
481. Magical String https://leetcode.com/problems/magical-string "A magical strin g S consists of only '1' and '2' and obeys the following rules:

The string S is magical because concatenating the number of contiguous occurrences o f characters '1' and '2' generates the string S itself.

The first few elements of string S is the following:
S = ""122112122112112122¿¿""

If we group the consecutive '1's and '2's in S, it will be:

1 22 11 2 1 22 1 22 11 2 11 22 ......

and the occurrences of '1's or '2's in each group are:

1 2 2 1 1 2 1 2 2 1 2 2 ......

You can see that the occurrence sequence above is the S itself.

Given an integer N as input, return the number of '1's in the first N number in the magical string S.

Note:
N will not exceed 100,000.

Example 1:

Input: 6
Output: 3
Explanation: The first 6 elements of magical string S is ""12211"" and it contains t hree 1's, so return 3."¿
482. License Key Formatting https://leetcode.com/problems/license-key-formatting "You are given a license key represented as a string S which consists only alphanume ric character and dashes. The string is separated into N+1 groups by N dashes.

Given a number K, we would want to reformat the strings such that each group contain s exactly K characters, except for the first group which could be shorter than K, bu t still must contain at least one character. Furthermore, there must be a dash inser ted between two groups and all lowercase letters should be converted to uppercase.

Given a non-empty string S and a number K, format the string according to the rules described above.

Example 1:

Input: S = ""5F3Z-2e-9-w"", K = 4

Output: ""5F3Z-2E9W""

Explanation: The string S has been split into two parts, each part has 4 characters.
Note that the two extra dashes are not needed and can be removed.

Example 2:

Input: S = ""2-5g-3-J"", K = 2

Output: ""2-5G-3J""

Explanation: The string S has been split into three parts, each part has 2 character
s except the first part as it could be shorter as mentioned above.

Note:

The length of string S will not exceed 12,000, and K is a positive integer.
String S consists only of alphanumerical characters (a-z and/or A-Z and/or 0-9) and dashes(-).
String S is non-empty."¿
483. Smallest Good Base https://leetcode.com/problems/smallest-good-base "For an integer n, we call k>=2 a good base of n, if all digits of n base k are 1.
Now given a string representing n, you should return the smallest good base of n in string format.

Example 1:

Input: ""13""
Output: ""3""
Explanation: 13 base 3 is 111.

Example 2:

Input: ""4681""
Output: ""8""
Explanation: 4681 base 8 is 11111.

Example 3:

Input: ""1000000000000000000""
Output: ""999999999999999999""
Explanation: 1000000000000000000 base 999999999999999999 is 11.

Note:

The range of n is [3, 10^18].
The string representing n is always valid and will not have leading zeros."¿
485. Max Consecutive Ones https://leetcode.com/problems/max-consecutive-ones "Giv
en a binary array, find the maximum number of consecutive 1s in this array.

Example 1:

```
Input: [1,1,0,1,1,1]
Output: 3
Explanation: The first two digits or the last three digits are consecutive 1s.
    The maximum number of consecutive 1s is 3.



Note:

The input array will only contain 0 and 1.
The length of input array is a positive integer and will not exceed 10,000"¿
486. Predict the Winner https://leetcode.com/problems/predict-the-winner    "Given a
n array of scores that are non-negative integers. Player 1 picks one of the numbers
from either end of the array followed by the player 2 and then player 1 and so on. E
ach time a player picks a number, that number will not be available for the next pla
yer. This continues until all the scores have been chosen. The player with the maxim
um score wins.

Given an array of scores, predict whether player 1 is the winner. You can assume eac
h player plays to maximize his score.

Example 1:

Input: [1, 5, 2]
Output: False
Explanation: Initially, player 1 can choose between 1 and 2.
If he chooses 2 (or 1), then player 2 can choose from 1 (or 2) and 5. If player 2 ch
ooses 5, then player 1 will be left with 1 (or 2).
So, final score of player 1 is 1 + 2 = 3, and player 2 is 5.
Hence, player 1 will never be the winner and you need to return False.



Example 2:

Input: [1, 5, 233, 7]
Output: True
Explanation: Player 1 first chooses 1. Then player 2 have to choose between 5 and 7.
 No matter which number player 2 choose, player 1 can choose 233.
Finally, player 1 has more score (234) than player 2 (12), so you need to return Tru
e representing player1 can win.



Note:


1 <= length of the array <= 20.
Any scores in the given array are non-negative integers and will not exceed 10,000,0
00.
If the scores of both players are equal, then player 1 is still the winner."¿
488. Zuma Game  https://leetcode.com/problems/zuma-game "Think about Zuma Game. You
have a row of balls on the table, colored red(R), yellow(Y), blue(B), green(G), and
white(W). You also have several balls in your hand.

Each time, you may choose a ball in your hand, and insert it into the row (including
 the leftmost place and rightmost place). Then, if there is a group of 3 or more bal
ls in the same color touching, remove these balls. Keep doing this until no more bal
ls can be removed.

Find the minimal balls you have to insert to remove all the balls on the table. If y
ou cannot remove all the balls, output -1.

Examples:

Input: ""WRRBBW"", ""RB""
Output: -1
Explanation: WRRBBW -> WRR[R]BBW -> WBBW -> WBB[B]W -> WW

Input: ""WWRRBBWW"", ""WRBRW""
Output: 2
Explanation: WWRRBBWW -> WWRR[R]BBWW -> WWBBWW -> WWBB[B]WW -> WWWW -> empty
```

Input:""G"", ""GGGGG""
Output: 2
Explanation: G -> G[G] -> GG[G] -> empty

Input: ""RBYYBBRRB"", ""YRBGB""
Output: 3
Explanation: RBYYBBRRB -> RBYY[Y]BBRRB -> RBBBRRB -> RRRB -> B -> B[B] -> BB[B] -> e
mpty

Note:

You may assume that the initial row of balls on the table won¿t have any 3 or more c
onsecutive balls with the same color.
The number of balls on the table won't exceed 20, and the string represents these ba
lls is called ""board"" in the input.
The number of balls in your hand won't exceed 5, and the string represents these bal
ls is called ""hand"" in the input.
Both input strings will be non-empty and only contain characters 'R','Y','B','G','W'
."¿
491. Increasing Subsequences https://leetcode.com/problems/increasing-subsequence
s "Given an integer array, your task is to find all the different possible increas
ing subsequences of the given array, and the length of an increasing subsequence sho
uld be at least 2 .

Example:

Input: [4, 6, 7, 7]
Output: [[4, 6], [4, 7], [4, 6, 7], [4, 6, 7, 7], [6, 7], [6, 7, 7], [7,7], [4,7,7]]

Note:

The length of the given array will not exceed 15.
The range of integer in the given array is [-100,100].
The given array may contain duplicates, and two equal integers should also be consid
ered as a special case of increasing sequence."¿
492. Construct the Rectangle https://leetcode.com/problems/construct-the-rectangl
e "For a web developer, it is very important to know how to design a web page's si
ze. So, given a specific rectangular web page¿s area, your job by now is to design a
rectangular web page, whose length L and width W satisfy the following requirements
:1. The area of the rectangular web page you designed must equal to the given target
area.

2. The width W should not be larger than the length L, which means L >= W.

3. The difference between length L and width W should be as small as possible.

You need to output the length L and the width W of the web page you designed in sequ
ence.

Example:

Input: 4
Output: [2, 2]
Explanation: The target area is 4, and all the possible ways to construct it are [1,
4], [2,2], [4,1].
But according to requirement 2, [1,4] is illegal; according to requirement 3, [4,1]
is not optimal compared to [2,2]. So the length L is 2, and the width W is 2.

Note:

The given area won't exceed 10,000,000 and is a positive integer

The web page's width and length you designed must be positive integers."¿
493. Reverse Pairs https://leetcode.com/problems/reverse-pairs "Given an array nums , we call (i, j) an important reverse pair if i < j and nums[i] > 2*nums[j].

You need to return the number of important reverse pairs in the given array.

Example1:
Input: [1,3,2,3,1]
Output: 2

Example2:
Input: [2,4,3,5,1]
Output: 3

Note:

The length of the given array will not exceed 50,000.
All the numbers in the input array are in the range of 32-bit integer."¿
494. Target Sum https://leetcode.com/problems/target-sum "You are given a list of non-negative integers, a1, a2, ..., an, and a target, S. Now you have 2 symbols + and -. For each integer, you should choose one from + and - as its new symbol.

Find out how many ways to assign symbols to make sum of integers equal to target S.

Example 1:

Input: nums is [1, 1, 1, 1, 1], S is 3.
Output: 5
Explanation:

-1+1+1+1+1 = 3
+1-1+1+1+1 = 3
+1+1-1+1+1 = 3
+1+1+1-1+1 = 3
+1+1+1+1-1 = 3

There are 5 ways to assign symbols to make the sum of nums be target 3.

Note:

The length of the given array is positive and will not exceed 20.
The sum of elements in the given array will not exceed 1000.
Your output answer is guaranteed to be fitted in a 32-bit integer."¿
495. Teemo Attacking https://leetcode.com/problems/teemo-attacking "In LOL world, there is a hero called Teemo and his attacking can make his enemy Ashe be in poisoned condition. Now, given the Teemo's attacking ascending time series towards Ashe and the poisoning time duration per Teemo's attacking, you need to output the total time that Ashe is in poisoned condition.

You may assume that Teemo attacks at the very beginning of a specific time point, and makes Ashe be in poisoned condition immediately.

Example 1:

Input: [1,4], 2
Output: 4
Explanation: At time point 1, Teemo starts attacking Ashe and makes Ashe be poisoned immediately.
This poisoned status will last 2 seconds until the end of time point 2.
And at time point 4, Teemo attacks Ashe again, and causes Ashe to be in poisoned status for another 2 seconds.
So you finally need to output 4.

Example 2:

Input: [1,2], 2
Output: 3
Explanation: At time point 1, Teemo starts attacking Ashe and makes Ashe be poisoned
.
This poisoned status will last 2 seconds until the end of time point 2.
However, at the beginning of time point 2, Teemo attacks Ashe again who is already i
n poisoned status.
Since the poisoned status won't add up together, though the second poisoning attack
will still work at time point 2, it will stop at the end of time point 3.
So you finally need to output 3.

Note:

You may assume the length of given time series array won't exceed 10000.
You may assume the numbers in the Teemo's attacking time series and his poisoning ti
me duration per attacking are non-negative integers, which won't exceed 10,000,000."
¿
496. Next Greater Element I https://leetcode.com/problems/next-greater-element-i
"You are given two arrays (without duplicates) nums1 and nums2 where nums1¿s element
s are subset of nums2. Find all the next greater numbers for nums1's elements in the
 corresponding places of nums2.

The Next Greater Number of a number x in nums1 is the first greater number to its ri
ght in nums2. If it does not exist, output -1 for this number.

Example 1:

Input: nums1 = [4,1,2], nums2 = [1,3,4,2].
Output: [-1,3,-1]
Explanation:
    For number 4 in the first array, you cannot find the next greater number for it
in the second array, so output -1.
    For number 1 in the first array, the next greater number for it in the second ar
ray is 3.
    For number 2 in the first array, there is no next greater number for it in the s
econd array, so output -1.

Example 2:

Input: nums1 = [2,4], nums2 = [1,2,3,4].
Output: [3,-1]
Explanation:
    For number 2 in the first array, the next greater number for it in the second ar
ray is 3.
    For number 4 in the first array, there is no next greater number for it in the s
econd array, so output -1.

Note:

All elements in nums1 and nums2 are unique.
The length of both nums1 and nums2 would not exceed 1000."¿
498. Diagonal Traverse https://leetcode.com/problems/diagonal-traverse "Given a mat
rix of M x N elements (M rows, N columns), return all elements of the matrix in diag
onal order as shown in the below image.

Example:

Input:
[
 [1, 2, 3],
 [4, 5, 6],
 [7, 8, 9]
]
Output: [1,2,4,7,5,3,6,8,9]
Explanation:

Note:

The total number of elements of the given matrix will not exceed 10,000."¿
500. Keyboard Row https://leetcode.com/problems/keyboard-row "Given a List of words, return the words that can be typed using letters of alphabet on only one row's of American keyboard like the image below.

Example 1:

Input: [""Hello"", ""Alaska"", ""Dad"", ""Peace""]
Output: [""Alaska"", ""Dad""]

Note:

You may use one character in the keyboard more than once.
You may assume the input string will only contain letters of alphabet."¿
501. Find Mode in Binary Search Tree https://leetcode.com/problems/find-mode-in-binary-search-tree "Given a binary search tree (BST) with duplicates, find all the mode(s) (the most frequently occurred element) in the given BST.

Assume a BST is defined as follows:

The left subtree of a node contains only nodes with keys less than or equal to the node's key.
The right subtree of a node contains only nodes with keys greater than or equal to the node's key.
Both the left and right subtrees must also be binary search trees.

For example:

Given BST [1,null,2,2],

```
   1
    \
     2
    /
   2
```

return [2].

Note:
If a tree has more than one mode, you can return them in any order.

Follow up:
Could you do that without using any extra space? (Assume that the implicit stack space incurred due to recursion does not count)."¿
502. IPO https://leetcode.com/problems/ipo "Suppose LeetCode will start its IPO soon. In order to sell a good price of its shares to Venture Capital, LeetCode would like to work on some projects to increase its capital before the IPO. Since it has limited resources, it can only finish at most k distinct projects before the IPO. Help LeetCode design the best way to maximize its total capital after finishing at most k distinct projects.

You are given several projects. For each project i, it has a pure profit Pi and a minimum capital of Ci is needed to start the corresponding project. Initially, you have W capital. When you finish a project, you will obtain its pure profit and the profit will be added to your total capital.

To sum up, pick a list of at most k distinct projects from given projects to maximize your final capital, and output your final maximized capital.

Example 1:

Input: k=2, W=0, Profits=[1,2,3], Capital=[0,1,1].

Output: 4

Explanation: Since your initial capital is 0, you can only start the project indexed 0.
 After finishing it you will obtain profit 1 and your capital becomes 1.
 With capital 1, you can either start the project indexed 1 or the project indexed 2.
 Since you can choose at most 2 projects, you need to finish the project indexed 2 to get the maximum capital.
 Therefore, output the final maximized capital, which is 0 + 1 + 3 = 4.

Note:

You may assume all numbers in the input are non-negative integers.
The length of Profits array and Capital array will not exceed 50,000.
The answer is guaranteed to fit in a 32-bit signed integer."¿
503. Next Greater Element II https://leetcode.com/problems/next-greater-element-ii "Given a circular array (the next element of the last element is the first element of the array), print the Next Greater Number for every element. The Next Greater Number of a number x is the first greater number to its traversing-order next in the array, which means you could search circularly to find its next greater number. If it doesn't exist, output -1 for this number.

Example 1:

Input: [1,2,1]
Output: [2,-1,2]
Explanation: The first 1's next greater number is 2;
The number 2 can't find next greater number;
The second 1's next greater number needs to search circularly, which is also 2.

Note:
The length of given array won't exceed 10000."¿
504. Base 7 https://leetcode.com/problems/base-7 "Given an integer, return its base 7 string representation.

Example 1:

Input: 100
Output: ""202""

Example 2:

Input: -7
Output: ""-10""

Note:
The input will be in range of [-1e7, 1e7]."¿
506. Relative Ranks https://leetcode.com/problems/relative-ranks "Given scores of N athletes, find their relative ranks and the people with the top three highest scores, who will be awarded medals: ""Gold Medal"", ""Silver Medal"" and ""Bronze Medal"".

Example 1:

Input: [5, 4, 3, 2, 1]
Output: [""Gold Medal"", ""Silver Medal"", ""Bronze Medal"", ""4"", ""5""]
Explanation: The first three athletes got the top three highest scores, so they got ""Gold Medal"", ""Silver Medal"" and ""Bronze Medal"".
For the left two athletes, you just need to output their relative ranks according to their scores.

Note:

N is a positive integer and won't exceed 10,000.
All the scores of athletes are guaranteed to be unique."¿
507. Perfect Number https://leetcode.com/problems/perfect-number "We define the Perfect Number is a positive integer that is equal to the sum of all its positive divisors except itself.

Now, given an integer n, write a function that returns true when it is a perfect number and false when it is not.

Example:

Input: 28
Output: True
Explanation: 28 = 1 + 2 + 4 + 7 + 14

Note:
The input number n will not exceed 100,000,000. (1e8)"¿
508. Most Frequent Subtree Sum https://leetcode.com/problems/most-frequent-subtree-sum "Given the root of a tree, you are asked to find the most frequent subtree sum. The subtree sum of a node is defined as the sum of all the node values formed by the subtree rooted at that node (including the node itself). So what is the most frequent subtree sum value? If there is a tie, return all the values with the highest frequency in any order.

Examples 1

Input:
```
  5
 /  \
2   -3
```

return [2, -3, 4], since all the values happen only once, return all of them in any order.

Examples 2

Input:
```
  5
 /  \
2   -5
```

return [2], since 2 happens twice, however -5 only occur once.

Note:
You may assume the sum of values in any subtree is in the range of 32-bit signed int eger."¿
513. Find Bottom Left Tree Value https://leetcode.com/problems/find-bottom-left-t ree-value "Given a binary tree, find the leftmost value in the last row of the tre e.

Example 1:

Input:

```
    2
   / \
  1   3
```

Output:
1

Example 2:

Input:

```
        1
       / \
      2   3
     /   / \
    4   5   6
       /
      7
```

Output:
7

Note:
You may assume the tree (i.e., the given root node) is not NULL."¿
514. Freedom Trail https://leetcode.com/problems/freedom-trail "In the video game F allout 4, the quest ""Road to Freedom"" requires players to reach a metal dial calle d the ""Freedom Trail Ring"", and use the dial to spell a specific keyword in order to open the door.

Given a string ring, which represents the code engraved on the outer ring and anothe r string key, which represents the keyword needs to be spelled. You need to find the minimum number of steps in order to spell all the characters in the keyword.

Initially, the first character of the ring is aligned at 12:00 direction. You need t o spell all the characters in the string key one by one by rotating the ring clockwi se or anticlockwise to make each character of the string key aligned at 12:00 direct ion and then by pressing the center button.

At the stage of rotating the ring to spell the key character key[i]:

You can rotate the ring clockwise or anticlockwise one place, which counts as 1 step

. The final purpose of the rotation is to align one of the string ring's characters at the 12:00 direction, where this character must equal to the character key[i].

If the character key[i] has been aligned at the 12:00 direction, you need to press t he center button to spell, which also counts as 1 step. After the pressing, you coul d begin to spell the next character in the key (next stage), otherwise, you've finis hed all the spelling.

Example:

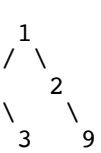
Input: ring = ""godding"", key = ""gd""
Output: 4
Explanation:
 For the first key character 'g', since it is already in place, we just need 1 step to spell this character.
 For the second key character 'd', we need to rotate the ring ""godding"" anticlockw ise by two steps to make it become ""ddinggo"".
 Also, we need 1 more step for spelling.
 So the final output is 4.

Note:

Length of both ring and key will be in range 1 to 100.
There are only lowercase letters in both strings and might be some duplcate characte rs in both strings.
It's guaranteed that string key could always be spelled by rotating the string ring. "¿
515. Find Largest Value in Each Tree Row https://leetcode.com/problems/find-large st-value-in-each-tree-row "You need to find the largest value in each row of a bin ary tree.

Example:

Input:



Output: [1, 3, 9]"¿
516. Longest Palindromic Subsequence https://leetcode.com/problems/longest-palind romic-subsequence "Given a string s, find the longest palindromic subsequence's le ngth in s. You may assume that the maximum length of s is 1000.

Example 1:

Input:
""bbbab""

Output:
4

One possible longest palindromic subsequence is ""bbbb"".

Example 2:

Input:
""cbbd""

Output:
2

One possible longest palindromic subsequence is ""bb"".¿
517. Super Washing Machines https://leetcode.com/problems/super-washing-machines
"You have n super washing machines on a line. Initially, each washing machine has so
me dresses or is empty.

For each move, you could choose any m (1 ¿ m ¿ n) washing machines, and pass one dre
ss of each washing machine to one of its adjacent washing machines at the same time
.

Given an integer array representing the number of dresses in each washing machine fr
om left to right on the line, you should find the minimum number of moves to make al
l the washing machines have the same number of dresses. If it is not possible to do
it, return -1.

Example1
Input: [1,0,5]

Output: 3

Explanation:
1st move: 1 0 <-- 5 => 1 1 4
2nd move: 1 <-- 1 <-- 4 => 2 1 3
3rd move: 2 1 <-- 3 => 2 2 2

Example2
Input: [0,3,0]

Output: 2

Explanation:
1st move: 0 <-- 3 0 => 1 2 0
2nd move: 1 2 --> 0 => 1 1 1

Example3
Input: [0,2,0]

Output: -1

Explanation:
It's impossible to make all the three washing machines have the same number of dress
es.

Note:

The range of n is [1, 10000].
The range of dresses number in a super washing machine is [0, 1e5].¿
518. Coin Change 2 https://leetcode.com/problems/coin-change-2 "You are given coins
of different denominations and a total amount of money. Write a function to compute
the number of combinations that make up that amount. You may assume that you have i
nfinite number of each kind of coin.

Note:
You can assume that

0 <= amount <= 5000
1 <= coin <= 5000
the number of coins is less than 500
the answer is guaranteed to fit into signed 32-bit integer

Example 1:
Input: amount = 5, coins = [1, 2, 5]
Output: 4
Explanation: there are four ways to make up the amount:
5=5
5=2+2+1
5=2+1+1+1
5=1+1+1+1+1

Example 2:
Input: amount = 3, coins = [2]
Output: 0
Explanation: the amount of 3 cannot be made up just with coins of 2.

Example 3:
Input: amount = 10, coins = [10]
Output: 1"¿
520. Detect Capital https://leetcode.com/problems/detect-capital "Given a word, y
ou need to judge whether the usage of capitals in it is right or not.

We define the usage of capitals in a word to be right when one of the following case
s holds:

All letters in this word are capitals, like ""USA"".
All letters in this word are not capitals, like ""leetcode"".
Only the first letter in this word is capital if it has more than one letter, like "
"Google"".

Otherwise, we define that this word doesn't use capitals in a right way.

Example 1:

Input: ""USA""
Output: True

Example 2:

Input: ""FlaG""
Output: False

Note:
The input will be a non-empty word consisting of uppercase and lowercase latin lette
rs."¿
521. Longest Uncommon Subsequence I https://leetcode.com/problems/longest-uncommon-s
ubsequence-i "Given a group of two strings, you need to find the longest uncommon
subsequence of this group of two strings.
The longest uncommon subsequence is defined as the longest subsequence of one of the
se strings and this subsequence should not be any subsequence of the other strings.

A subsequence is a sequence that can be derived from one sequence by deleting some c
haracters without changing the order of the remaining elements. Trivially, any strin
g is a subsequence of itself and an empty string is a subsequence of any string.

The input will be two strings, and the output needs to be the length of the longest
uncommon subsequence. If the longest uncommon subsequence doesn't exist, return -1.

Example 1:

Input: ""aba"", ""cdc""
Output: 3
Explanation: The longest uncommon subsequence is ""aba"" (or ""cdc""),
because ""aba"" is a subsequence of ""aba"",
but not a subsequence of any other strings in the group of two strings.

Note:

Both strings' lengths will not exceed 100.
Only letters from a ~ z will appear in input strings."¿
522. Longest Uncommon Subsequence II https://leetcode.com/problems/longest-uncommon-subsequence-ii "Given a list of strings, you need to find the longest uncommon subsequence among them. The longest uncommon subsequence is defined as the longest subsequence of one of these strings and this subsequence should not be any subsequence of the other strings.

A subsequence is a sequence that can be derived from one sequence by deleting some characters without changing the order of the remaining elements. Trivially, any string is a subsequence of itself and an empty string is a subsequence of any string.

The input will be a list of strings, and the output needs to be the length of the longest uncommon subsequence. If the longest uncommon subsequence doesn't exist, return -1.

Example 1:

Input: ""aba"", ""cdc"", ""eae""
Output: 3

Note:

All the given strings' lengths will not exceed 10.
The length of the given list will be in the range of [2, 50]."¿
523. Continuous Subarray Sum https://leetcode.com/problems/continuous-subarray-sum "Given a list of non-negative numbers and a target integer k, write a function to check if the array has a continuous subarray of size at least 2 that sums up to the multiple of k, that is, sums up to n*k where n is also an integer.

Example 1:

Input: [23, 2, 4, 6, 7], k=6
Output: True
Explanation: Because [2, 4] is a continuous subarray of size 2 and sums up to 6.

Example 2:

Input: [23, 2, 6, 4, 7], k=6
Output: True
Explanation: Because [23, 2, 6, 4, 7] is an continuous subarray of size 5 and sums up to 42.

Note:

The length of the array won't exceed 10,000.
You may assume the sum of all the numbers is in the range of a signed 32-bit integer."¿

524. Longest Word in Dictionary through Deleting https://leetcode.com/problems/longest-word-in-dictionary-through-deleting "Given a string and a string dictionary, find the longest string in the dictionary that can be formed by deleting some characters of the given string. If there are more than one possible results, return the longest word with the smallest lexicographical order. If there is no possible result, return the empty string.

Example 1:

Input:
s = ""abpcplea"", d = [""ale"",""apple"",""monkey"",""plea""]

Output:
""apple""

Example 2:

Input:
s = ""abpcplea"", d = [""a"",""b"",""c""]

Output:
""a""

Note:

All the strings in the input will only contain lower-case letters.
The size of the dictionary won't exceed 1,000.
The length of all the strings in the input won't exceed 1,000."¿
525. Contiguous Array https://leetcode.com/problems/contiguous-array "Given a binary array, find the maximum length of a contiguous subarray with equal number of 0 and 1.

Example 1:

Input: [0,1]
Output: 2
Explanation: [0, 1] is the longest contiguous subarray with equal number of 0 and 1.

Example 2:

Input: [0,1,0]
Output: 2
Explanation: [0, 1] (or [1, 0]) is a longest contiguous subarray with equal number of 0 and 1.

Note:
The length of the given binary array will not exceed 50,000."¿
526. Beautiful Arrangement https://leetcode.com/problems/beautiful-arrangement "Suppose you have N integers from 1 to N. We define a beautiful arrangement as an array that is constructed by these N numbers successfully if one of the following is true for the ith position (1 <= i <= N) in this array:

The number at the ith position is divisible by i.
i is divisible by the number at the ith position.

Now given N, how many beautiful arrangements can you construct?

Example 1:

Input: 2
Output: 2
Explanation:

The first beautiful arrangement is [1, 2]:

Number at the 1st position (i=1) is 1, and 1 is divisible by i (i=1).

Number at the 2nd position (i=2) is 2, and 2 is divisible by i (i=2).

The second beautiful arrangement is [2, 1]:

Number at the 1st position (i=1) is 2, and 2 is divisible by i (i=1).

Number at the 2nd position (i=2) is 1, and i (i=2) is divisible by 1.

Note:

N is a positive integer and will not exceed 15."¿
529. Minesweeper https://leetcode.com/problems/minesweeper "Let's play the mine sweeper game (Wikipedia, online game)!

You are given a 2D char matrix representing the game board. 'M' represents an unrevealed mine, 'E' represents an unrevealed empty square, 'B' represents a revealed blank square that has no adjacent (above, below, left, right, and all 4 diagonals) mines, digit ('1' to '8') represents how many mines are adjacent to this revealed square, and finally 'X' represents a revealed mine.

Now given the next click position (row and column indices) among all the unrevealed squares ('M' or 'E'), return the board after revealing this position according to the following rules:

If a mine ('M') is revealed, then the game is over - change it to 'X'.
If an empty square ('E') with no adjacent mines is revealed, then change it to revealed blank ('B') and all of its adjacent unrevealed squares should be revealed recursively.
If an empty square ('E') with at least one adjacent mine is revealed, then change it to a digit ('1' to '8') representing the number of adjacent mines.
Return the board when no more squares will be revealed.

Example 1:

Input:

```
[['E', 'E', 'E', 'E', 'E'],
 ['E', 'E', 'M', 'E', 'E'],
 ['E', 'E', 'E', 'E', 'E'],
 ['E', 'E', 'E', 'E', 'E']]
```

Click : [3,0]

Output:

```
[['B', '1', 'E', '1', 'B'],
 ['B', '1', 'M', '1', 'B'],
 ['B', '1', '1', '1', 'B'],
 ['B', 'B', 'B', 'B', 'B']]
```

Explanation:

Example 2:

Input:

```
[['B', '1', 'E', '1', 'B'],
 ['B', '1', 'M', '1', 'B'],
 ['B', '1', '1', '1', 'B'],
 ['B', 'B', 'B', 'B', 'B']]
```

Click : [1,2]

Output:

```
[['B', '1', 'E', '1', 'B'],
 ['B', '1', 'X', '1', 'B'],
 ['B', '1', '1', '1', 'B'],
 ['B', 'B', 'B', 'B', 'B']]
```

Explanation:

Note:

The range of the input matrix's height and width is [1,50].
The click position will only be an unrevealed square ('M' or 'E'), which also means the input board contains at least one clickable square.
The input board won't be a stage when game is over (some mines have been revealed).
For simplicity, not mentioned rules should be ignored in this problem. For example, you don't need to reveal all the unrevealed mines when the game is over, consider an y cases that you will win the game or flag any squares."¿
530. Minimum Absolute Difference in BST https://leetcode.com/problems/minimum-absolu te-difference-in-bst "Given a binary search tree with non-negative values, find t he minimum absolute difference between values of any two nodes.

Example:
Input:

```
   1
    \
     3
    /
   2
```

Output:
1

Explanation:
The minimum absolute difference is 1, which is the difference between 2 and 1 (or be tween 2 and 3).

Note:
There are at least two nodes in this BST."¿
532. K-diff Pairs in an Array https://leetcode.com/problems/k-diff-pairs-in-an-arr ay "Given an array of integers and an integer k, you need to find the number of uni que k-diff pairs in the array. Here a k-diff pair is defined as an integer pair (i, j), where i and j are both numbers in the array and their absolute difference is k.

Example 1:

Input: [3, 1, 4, 1, 5], k = 2
Output: 2
Explanation: There are two 2-diff pairs in the array, (1, 3) and (3, 5).
Although we have two 1s in the input, we should only return the number of unique pai rs.

Example 2:

Input:[1, 2, 3, 4, 5], k = 1
Output: 4
Explanation: There are four 1-diff pairs in the array, (1, 2), (2, 3), (3, 4) and (4
, 5).

Example 3:

Input: [1, 3, 1, 5, 4], k = 0
Output: 1
Explanation: There is one 0-diff pair in the array, (1, 1).

Note:

The pairs (i, j) and (j, i) count as the same pair.
The length of the array won't exceed 10,000.
All the integers in the given input belong to the range: [-1e7, 1e7]."¿
535. Encode and Decode TinyURL https://leetcode.com/problems/encode-and-decode-tiny
url "Note: This is a companion problem to the System Design problem: Design TinyURL.

TinyURL is a URL shortening service where you enter a URL such as https://leetcode.c
om/problems/design-tinyurl and it returns a short URL such as http://tinyurl.com/4e9
iAk.

Design the encode and decode methods for the TinyURL service. There is no restrictio
n on how your encode/decode algorithm should work. You just need to ensure that a UR
L can be encoded to a tiny URL and the tiny URL can be decoded to the original URL."
¿
537. Complex Number Multiplication https://leetcode.com/problems/complex-number-mul
tiplication "Given two strings representing two complex numbers.

You need to return a string representing their multiplication. Note i2 = -1 accordin
g to the definition.

Example 1:

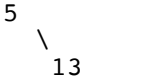
Input: ""1+1i"", ""1+1i""
Output: ""0+2i""
Explanation: (1 + i) * (1 + i) = 1 + i2 + 2 * i = 2i, and you need convert it to the
 form of 0+2i.

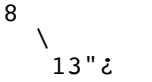
Example 2:

Input: ""1+-1i"", ""1+-1i""
Output: ""0+-2i""
Explanation: (1 - i) * (1 - i) = 1 + i2 - 2 * i = -2i, and you need convert it to th
e form of 0+-2i.

Note:

The input strings will not have extra blank.
The input strings will be given in the form of a+bi, where the integer a and b will
both belong to the range of [-100, 100]. And the output should be also in this form.
"¿
538. Convert BST to Greater Tree https://leetcode.com/problems/convert-bst-to-gre
ater-tree "Given a Binary Search Tree (BST), convert it to a Greater Tree such tha
t every key of the original BST is changed to the original key plus sum of all keys
greater than the original key in BST.

Example:
Input: The root of a Binary Search Tree like this:


Output: The root of a Greater Tree like this:

"¿
539. Minimum Time Difference https://leetcode.com/problems/minimum-time-differenc
e "Given a list of 24-hour clock time points in ""Hour:Minutes"" format, find the
minimum minutes difference between any two time points in the list.

Example 1:

Input: [""23:59"",""00:00""]
Output: 1

Note:

The number of time points in the given list is at least 2 and won't exceed 20000.
The input time is legal and ranges from 00:00 to 23:59."¿
540. Single Element in a Sorted Array https://leetcode.com/problems/single-element
-in-a-sorted-array "Given a sorted array consisting of only integers where every el
ement appears twice except for one element which appears once. Find this single elem
ent that appears only once.

Example 1:

Input: [1,1,2,3,3,4,4,8,8]
Output: 2

Example 2:

Input: [3,3,7,7,10,11,11]
Output: 10

Note:
Your solution should run in O(log n) time and O(1) space."¿
541. Reverse String II https://leetcode.com/problems/reverse-string-ii "Given a str
ing and an integer k, you need to reverse the first k characters for every 2k charac
ters counting from the start of the string. If there are less than k characters left
, reverse all of them. If there are less than 2k but greater than or equal to k char
acters, then reverse the first k characters and left the other as original.

Example:

Input: s = ""abcdefg"", k = 2
Output: ""bacdfeg""

Restrictions:

The string consists of lower English letters only.
Length of the given string and k will in the range [1, 10000]"¿
542. 01 Matrix https://leetcode.com/problems/01-matrix "Given a matrix consists of
0 and 1, find the distance of the nearest 0 for each cell.

The distance between two adjacent cells is 1.

Example 1:

Input:
0 0 0
0 1 0
0 0 0

Output:
0 0 0
0 1 0
0 0 0

Example 2:

Input:
0 0 0
0 1 0
1 1 1

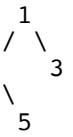
Output:
0 0 0
0 1 0
1 2 1

Note:

The number of elements of the given matrix will not exceed 10,000.
There are at least one 0 in the given matrix.
The cells are adjacent in only four directions: up, down, left and right."¿
543. Diameter of Binary Tree https://leetcode.com/problems/diameter-of-binary-tre e "Given a binary tree, you need to compute the length of the diameter of the tree . The diameter of a binary tree is the length of the longest path between any two no des in a tree. This path may or may not pass through the root.

Example:

Given a binary tree



Return 3, which is the length of the path [4,2,1,3] or [5,2,1,3].

Note:
The length of path between two nodes is represented by the number of edges between t hem."¿
546. Remove Boxes https://leetcode.com/problems/remove-boxes "Given several boxes with different colors represented by different positive numbers.

You may experience several rounds to remove boxes until there is no box left. Each t ime you can choose some continuous boxes with the same color (composed of k boxes, k >= 1), remove them and get k*k points.

Find the maximum points you can get.

Example 1:

Input:
[1, 3, 2, 2, 2, 3, 4, 3, 1]

Output:
23

Explanation:
[1, 3, 2, 2, 2, 3, 4, 3, 1]
----> [1, 3, 3, 4, 3, 1] (3*3=9 points)
----> [1, 3, 3, 3, 1] (1*1=1 points)
----> [1, 1] (3*3=9 points)
----> [] (2*2=4 points)

Note:
The number of boxes n would not exceed 100."¿
547. Friend Circles https://leetcode.com/problems/friend-circles "There are N students in a class. Some of them are friends, while some are not. Their friendship is transitive in nature. For example, if A is a direct friend of B, and B is a direct friend of C, then A is an indirect friend of C. And we defined a friend circle is a group of students who are direct or indirect friends.

Given a N*N matrix M representing the friend relationship between students in the class. If M[i][j] = 1, then the ith and jth students are direct friends with each other, otherwise not. And you have to output the total number of friend circles among all the students.

Example 1:

Input:
[[1,1,0],
 [1,1,0],
 [0,0,1]]
Output: 2
Explanation:The 0th and 1st students are direct friends, so they are in a friend circle.
The 2nd student himself is in a friend circle. So return 2.

Example 2:

Input:
[[1,1,0],
 [1,1,1],
 [0,1,1]]
Output: 1
Explanation:The 0th and 1st students are direct friends, the 1st and 2nd students are direct friends,
so the 0th and 2nd students are indirect friends. All of them are in the same friend circle, so return 1.

Note:

N is in range [1,200].
M[i][i] = 1 for all students.
If M[i][j] = 1, then M[j][i] = 1."¿
551. Student Attendance Record I https://leetcode.com/problems/student-attendance-record-i "You are given a string representing an attendance record for a student. The record only contains the following three characters:

'A' : Absent.
'L' : Late.
'P' : Present.

A student could be rewarded if his attendance record doesn't contain more than one '
A' (absent) or more than two continuous 'L' (late).

You need to return whether the student could be rewarded according to his attendance
 record.

Example 1:

Input: ""PPALLP""
Output: True

Example 2:

Input: ""PPALLL""
Output: False"¿
552. Student Attendance Record II https://leetcode.com/problems/student-attendance
-record-ii "Given a positive integer n, return the number of all possible attendanc
e records with length n, which will be regarded as rewardable. The answer may be ver
y large, return it after mod 109 + 7.

A student attendance record is a string that only contains the following three chara
cters:

'A' : Absent.
'L' : Late.
 'P' : Present.

A record is regarded as rewardable if it doesn't contain more than one 'A' (absent)
or more than two continuous 'L' (late).

Example 1:

Input: n = 2
Output: 8
Explanation:
There are 8 records with length 2 will be regarded as rewardable:
""PP"" , ""AP"", ""PA"", ""LP"", ""PL"", ""AL"", ""LA"", ""LL""
Only ""AA"" won't be regarded as rewardable owing to more than one absent times.

Note:
The value of n won't exceed 100,000."¿
553. Optimal Division https://leetcode.com/problems/optimal-division "Given a lis
t of positive integers, the adjacent integers will perform the float division. For e
xample, [2,3,4] -> 2 / 3 / 4.

However, you can add any number of parenthesis at any position to change the priorit
y of operations. You should find out how to add parenthesis to get the maximum resul
t, and return the corresponding expression in string format. Your expression should
NOT contain redundant parenthesis.

Example:

Input: [1000,100,10,2]
Output: ""1000/(100/10/2)""
Explanation:
1000/(100/10/2) = 1000/((100/10)/2) = 200
However, the bold parenthesis in ""1000/((100/10)/2)"" are redundant,
since they don't influence the operation priority. So you should return ""1000/(100/
10/2)"".

Other cases:

1000/(100/10)/2 = 50
1000/(100/(10/2)) = 50
1000/100/10/2 = 0.5
1000/100/(10/2) = 2

Note:

The length of the input array is [1, 10].
Elements in the given array will be in range [2, 1000].
There is only one optimal division for each test case."¿
554. Brick Wall https://leetcode.com/problems/brick-wall "There is a brick wall i
n front of you. The wall is rectangular and has several rows of bricks. The bricks h
ave the same height but different width. You want to draw a vertical line from the t
op to the bottom and cross the least bricks.

The brick wall is represented by a list of rows. Each row is a list of integers repr
esenting the width of each brick in this row from left to right.

If your line go through the edge of a brick, then the brick is not considered as cro
ssed. You need to find out how to draw the line to cross the least bricks and return
 the number of crossed bricks.

You cannot draw a line just along one of the two vertical edges of the wall, in whic
h case the line will obviously cross no bricks.

Example:

Input:
[[1,2,2,1],
 [3,1,2],
 [1,3,2],
 [2,4],
 [3,1,2],
 [1,3,1,1]]
Output: 2
Explanation:

Note:

The width sum of bricks in different rows are the same and won't exceed INT_MAX.
The number of bricks in each row is in range [1,10,000]. The height of wall is in ra
nge [1,10,000]. Total number of bricks of the wall won't exceed 20,000."¿
556. Next Greater Element III https://leetcode.com/problems/next-greater-element-i
ii "Given a positive 32-bit integer n, you need to find the smallest 32-bit integer
 which has exactly the same digits existing in the integer n and is greater in value
 than n. If no such positive 32-bit integer exists, you need to return -1.

Example 1:

Input: 12
Output: 21

Example 2:

Input: 21
Output: -1"¿
557. Reverse Words in a String III https://leetcode.com/problems/reverse-words-in-a
-string-iii "Given a string, you need to reverse the order of characters in each wor
d within a sentence while still preserving whitespace and initial word order.

Example 1:

Input: ""Let's take LeetCode contest""
Output: ""s'teL ekat edoCteeL tsetnoc""

Note:
In the string, each word is separated by single space and there will not be any extr
a space in the string."¿
560. Subarray Sum Equals K https://leetcode.com/problems/subarray-sum-equals-k "Giv
en an array of integers and an integer k, you need to find the total number of conti
nuous subarrays whose sum equals to k.

Example 1:

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

Note:

The length of the array is in range [1, 20,000].
The range of numbers in the array is [-1000, 1000] and the range of the integer k is
 [-1e7, 1e7]."¿
561. Array Partition I https://leetcode.com/problems/array-partition-i "Given an ar
ray of 2n integers, your task is to group these integers into n pairs of integer, sa
y (a1, b1), (a2, b2), ..., (an, bn) which makes sum of min(ai, bi) for all i from 1
to n as large as possible.

Example 1:

Input: [1,4,3,2]

Output: 4
Explanation: n is 2, and the maximum sum of pairs is 4 = min(1, 2) + min(3, 4).

Note:

n is a positive integer, which is in the range of [1, 10000].
All the integers in the array will be in the range of [-10000, 10000]."¿
563. Binary Tree Tilt https://leetcode.com/problems/binary-tree-tilt "Given a bin
ary tree, return the tilt of the whole tree.

The tilt of a tree node is defined as the absolute difference between the sum of all
 left subtree node values and the sum of all right subtree node values. Null node ha
s tilt 0.

The tilt of the whole tree is defined as the sum of all nodes' tilt.

Example:

Input:
```
         1
       /   \
      2     3
```
Output: 1
Explanation:
Tilt of node 2 : 0
Tilt of node 3 : 0
Tilt of node 1 : |2-3| = 1
Tilt of binary tree : 0 + 0 + 1 = 1

Note:

The sum of node values in any subtree won't exceed the range of 32-bit integer.
All the tilt values won't exceed the range of 32-bit integer."¿

564. Find the Closest Palindrome https://leetcode.com/problems/find-the-closest-palindrome "Given an integer n, find the closest integer (not including itself), which is a palindrome.

The 'closest' is defined as absolute difference minimized between two integers.

Example 1:

Input: ""123""
Output: ""121""

Note:

The input n is a positive integer represented by string, whose length will not exceed 18.
If there is a tie, return the smaller one as answer."¿
565. Array Nesting https://leetcode.com/problems/array-nesting "A zero-indexed array A of length N contains all integers from 0 to N-1. Find and return the longest length of set S, where S[i] = {A[i], A[A[i]], A[A[A[i]]], ... } subjected to the rule below.

Suppose the first element in S starts with the selection of element A[i] of index = i, the next element in S should be A[A[i]], and then A[A[A[i]]]¿ By that analogy, we stop adding right before a duplicate element occurs in S.

Example 1:

Input: A = [5,4,0,3,1,6,2]
Output: 4
Explanation:
A[0] = 5, A[1] = 4, A[2] = 0, A[3] = 3, A[4] = 1, A[5] = 6, A[6] = 2.

One of the longest S[K]:
S[0] = {A[0], A[5], A[6], A[2]} = {5, 6, 2, 0}

Note:

N is an integer within the range [1, 20,000].
The elements of A are all distinct.
Each element of A is an integer within the range [0, N-1]."¿
566. Reshape the Matrix https://leetcode.com/problems/reshape-the-matrix "In MATLAB, there is a very useful function called 'reshape', which can reshape a matrix into a new one with different size but keep its original data.

You're given a matrix represented by a two-dimensional array, and two positive integers r and c representing the row number and column number of the wanted reshaped matrix, respectively.

The reshaped matrix need to be filled with all the elements of the original matrix in the same row-traversing order as they were.

If the 'reshape' operation with given parameters is possible and legal, output the new reshaped matrix; Otherwise, output the original matrix.

Example 1:

Input:
nums =
[[1,2],
 [3,4]]
r = 1, c = 4
Output:

[[1,2,3,4]]
Explanation:
The row-traversing of nums is [1,2,3,4]. The new reshaped matrix is a 1 * 4 matrix, fill it row by row by using the previous list.

Example 2:

Input:
nums =
[[1,2],
 [3,4]]
r = 2, c = 4
Output:
[[1,2],
 [3,4]]
Explanation:
There is no way to reshape a 2 * 2 matrix to a 2 * 4 matrix. So output the original matrix.

Note:

The height and width of the given matrix is in range [1, 100].
The given r and c are all positive."¿
567. Permutation in String https://leetcode.com/problems/permutation-in-string "Given two strings s1 and s2, write a function to return true if s2 contains the permutation of s1. In other words, one of the first string's permutations is the substring of the second string.

Example 1:

Input:s1 = ""ab"" s2 = ""eidbaooo""
Output:True
Explanation: s2 contains one permutation of s1 (""ba"").

Example 2:

Input:s1= ""ab"" s2 = ""eidboaoo""
Output: False

Note:

The input strings only contain lower case letters.
The length of both given strings is in range [1, 10,000]."¿
572. Subtree of Another Tree https://leetcode.com/problems/subtree-of-another-tree "Given two non-empty binary trees s and t, check whether tree t has exactly the same structure and node values with a subtree of s. A subtree of s is a tree consists of a node in s and all of this node's descendants. The tree s could also be considered as a subtree of itself.

Example 1:

Given tree s:
```
     3
    / \
   4   5
  / \
 1   2
```

Given tree t:
```
   4
  / \
```

```
 1   2
```

Return true, because t has the same structure and node values with a subtree of s.

Example 2:

Given tree s:

```
     3
    / \
   4   5
  / \
 1   2
    /
   0
```

Given tree t:

```
   4
  / \
 1   2
```

Return false."¿
575. Distribute Candies https://leetcode.com/problems/distribute-candies "Given an integer array with even length, where different numbers in this array represent different kinds of candies. Each number means one candy of the corresponding kind. You need to distribute these candies equally in number to brother and sister. Return the maximum number of kinds of candies the sister could gain.

Example 1:

Input: candies = [1,1,2,2,3,3]
Output: 3
Explanation:
There are three different kinds of candies (1, 2 and 3), and two candies for each kind.
Optimal distribution: The sister has candies [1,2,3] and the brother has candies [1,2,3], too.
The sister has three different kinds of candies.

Example 2:

Input: candies = [1,1,2,3]
Output: 2
Explanation: For example, the sister has candies [2,3] and the brother has candies [1,1].
The sister has two different kinds of candies, the brother has only one kind of candies.

Note:

The length of the given array is in range [2, 10,000], and will be even.
The number in given array is in range [-100,000, 100,000]."¿
576. Out of Boundary Paths https://leetcode.com/problems/out-of-boundary-paths "There is an m by n grid with a ball. Given the start coordinate (i,j) of the ball, you can move the ball to adjacent cell or cross the grid boundary in four directions (up, down, left, right). However, you can at most move N times. Find out the number of paths to move the ball out of grid boundary. The answer may be very large, return it after mod 109 + 7.

Example 1:

Input:m = 2, n = 2, N = 2, i = 0, j = 0
Output: 6
Explanation:

Example 2:

Input:m = 1, n = 3, N = 3, i = 0, j = 1
Output: 12
Explanation:

Note:

Once you move the ball out of boundary, you cannot move it back.
The length and height of the grid is in range [1,50].
N is in range [0,50]."¿
581. Shortest Unsorted Continuous Subarray https://leetcode.com/problems/shortest-unsorted-continuous-subarray "Given an integer array, you need to find one continuous subarray that if you only sort this subarray in ascending order, then the whole array will be sorted in ascending order, too.

You need to find the shortest such subarray and output its length.

Example 1:

Input: [2, 6, 4, 8, 10, 9, 15]
Output: 5
Explanation: You need to sort [6, 4, 8, 10, 9] in ascending order to make the whole array sorted in ascending order.

Note:

Then length of the input array is in range [1, 10,000].
The input array may contain duplicates, so ascending order here means <=."¿
583. Delete Operation for Two Strings https://leetcode.com/problems/delete-operation-for-two-strings "Given two words word1 and word2, find the minimum number of steps required to make word1 and word2 the same, where in each step you can delete one character in either string.

Example 1:

Input: ""sea"", ""eat""
Output: 2
Explanation: You need one step to make ""sea"" to ""ea"" and another step to make ""eat"" to ""ea"".

Note:

The length of given words won't exceed 500.
Characters in given words can only be lower-case letters."¿
587. Erect the Fence https://leetcode.com/problems/erect-the-fence "There are some trees, where each tree is represented by (x,y) coordinate in a two-dimensional garden. Your job is to fence the entire garden using the minimum length of rope as it is expensive. The garden is well fenced only if all the trees are enclosed. Your task is to help find the coordinates of trees which are exactly located on the fence perimeter.

Example 1:

Input: [[1,1],[2,2],[2,0],[2,4],[3,3],[4,2]]
Output: [[1,1],[2,0],[4,2],[3,3],[2,4]]
Explanation:

Example 2:

Input: [[1,2],[2,2],[4,2]]
Output: [[1,2],[2,2],[4,2]]
Explanation:

Even you only have trees in a line, you need to use rope to enclose them.

Note:

All trees should be enclosed together. You cannot cut the rope to enclose trees that will separate them in more than one group.
All input integers will range from 0 to 100.
The garden has at least one tree.
All coordinates are distinct.
Input points have NO order. No order required for output."¿
591. Tag Validator https://leetcode.com/problems/tag-validator "Given a string representing a code snippet, you need to implement a tag validator to parse the code and return whether it is valid. A code snippet is valid if all the following rules hold:

The code must be wrapped in a valid closed tag. Otherwise, the code is invalid.
A closed tag (not necessarily valid) has exactly the following format : <TAG_NAME>TAG_CONTENT</TAG_NAME>. Among them, <TAG_NAME> is the start tag, and </TAG_NAME> is the end tag. The TAG_NAME in start and end tags should be the same. A closed tag is valid if and only if the TAG_NAME and TAG_CONTENT are valid.
A valid TAG_NAME only contain upper-case letters, and has length in range [1,9]. Otherwise, the TAG_NAME is invalid.
A valid TAG_CONTENT may contain other valid closed tags, cdata and any characters (see note1) EXCEPT unmatched <, unmatched start and end tag, and unmatched or closed tags with invalid TAG_NAME. Otherwise, the TAG_CONTENT is invalid.
A start tag is unmatched if no end tag exists with the same TAG_NAME, and vice versa. However, you also need to consider the issue of unbalanced when tags are nested.
A < is unmatched if you cannot find a subsequent >. And when you find a < or </, all the subsequent characters until the next > should be parsed as TAG_NAME (not necessarily valid).
The cdata has the following format : <![CDATA[CDATA_CONTENT]]>. The range of CDATA_CONTENT is defined as the characters between <![CDATA[and the first subsequent]]>.
CDATA_CONTENT may contain any characters. The function of cdata is to forbid the validator to parse CDATA_CONTENT, so even it has some characters that can be parsed as tag (no matter valid or invalid), you should treat it as regular characters.

Valid Code Examples:

Input: ""<DIV>This is the first line <![CDATA[<div>]]></DIV>""

Output: True

Explanation:

The code is wrapped in a closed tag : <DIV> and </DIV>.

The TAG_NAME is valid, the TAG_CONTENT consists of some characters and cdata.

Although CDATA_CONTENT has unmatched start tag with invalid TAG_NAME, it should be considered as plain text, not parsed as tag.

So TAG_CONTENT is valid, and then the code is valid. Thus return true.

Input: ""<DIV>>> ![cdata[]] <![CDATA[<div>]>]]>]]>>]</DIV>""

Output: True

Explanation:

We first separate the code into : start_tag|tag_content|end_tag.

start_tag -> ""<DIV>""

end_tag -> ""</DIV>""

tag_content could also be separated into : text1|cdata|text2.

text1 -> "">> ![cdata[]] ""

cdata -> ""<![CDATA[<div>]>]]>"", where the CDATA_CONTENT is ""<div>]>""

text2 -> ""]]>>]""

The reason why start_tag is NOT ""<DIV>>>"" is because of the rule 6.
The reason why cdata is NOT ""<![CDATA[<div>]>]]>]]>"" is because of the rule 7.

Invalid Code Examples:

Input: ""<A> <B> </A>   </B>""
Output: False
Explanation: Unbalanced. If ""<A>"" is closed, then ""<B>"" must be unmatched, and v
ice versa.

Input: ""<DIV> div tag is not closed <DIV>""
Output: False

Input: ""<DIV> unmatched < </DIV>""
Output: False

Input: ""<DIV> closed tags with invalid tag name 123 </DIV>""
Output: False

Input: ""<DIV> unmatched tags with invalid tag name </1234567890> and <CDATA[[]]>
</DIV>""
Output: False

Input: ""<DIV> unmatched start tag <B> and unmatched end tag </C> </DIV>""
Output: False

Note:

For simplicity, you could assume the input code (including the any characters mentio
ned above) only contain letters, digits, '<','>','/','!','[',']' and ' '."¿
592. Fraction Addition and Subtraction https://leetcode.com/problems/fraction-addit
ion-and-subtraction "Given a string representing an expression of fraction addition
and subtraction, you need to return the calculation result in string format. The fin
al result should be irreducible fraction. If your final result is an integer, say 2,
 you need to change it to the format of fraction that has denominator 1. So in this
case, 2 should be converted to 2/1.

Example 1:

Input:""-1/2+1/2""
Output: ""0/1""

Example 2:

Input:""-1/2+1/2+1/3""
Output: ""1/3""

Example 3:

Input:""1/3-1/2""
Output: ""-1/6""

Example 4:

Input:""5/3+1/3""
Output: ""2/1""

Note:

The input string only contains '0' to '9', '/', '+' and '-'. So does the output.
Each fraction (input and output) has format ±numerator/denominator. If the first inp ut fraction or the output is positive, then '+' will be omitted.
The input only contains valid irreducible fractions, where the numerator and denomin ator of each fraction will always be in the range [1,10]. If the denominator is 1, i t means this fraction is actually an integer in a fraction format defined above.
The number of given fractions will be in the range [1,10].
The numerator and denominator of the final result are guaranteed to be valid and in the range of 32-bit int."¿
593. Valid Square https://leetcode.com/problems/valid-square "Given the coordinat es of four points in 2D space, return whether the four points could construct a squa re.

The coordinate (x,y) of a point is represented by an integer array with two integers .

Example:

Input: p1 = [0,0], p2 = [1,1], p3 = [1,0], p4 = [0,1]
Output: True

Note:

All the input integers are in the range [-10000, 10000].
A valid square has four equal sides with positive length and four equal angles (90-d egree angles).
Input points have no order."¿
594. Longest Harmonious Subsequence https://leetcode.com/problems/longest-harmonious -subsequence "We define a harmonious array is an array where the difference betwe en its maximum value and its minimum value is exactly 1.

Now, given an integer array, you need to find the length of its longest harmonious s ubsequence among all its possible subsequences.

Example 1:

Input: [1,3,2,2,5,2,3,7]
Output: 5
Explanation: The longest harmonious subsequence is [3,2,2,2,3].

Note:
The length of the input array will not exceed 20,000."¿
595. Big Countries https://leetcode.com/problems/big-countries "There is a table Wo rld

name	continent	area	population	gdp
Afghanistan	Asia	652230	25500100	20343000
Albania	Europe	28748	2831741	12960000
Algeria	Africa	2381741	37100000	188681000
Andorra	Europe	468	78115	3712000
Angola	Africa	1246700	20609294	100990000

A country is big if it has an area of bigger than 3 million square km or a populatio n of more than 25 million.

Write a SQL solution to output big countries' name, population and area.

For example, according to the above table, we should output:

```
+--------------+-------------+--------------+
| name         | population  | area         |
+--------------+-------------+--------------+
| Afghanistan  | 25500100    | 652230       |
| Algeria      | 37100000    | 2381741      |
+--------------+-------------+--------------+"¿
```

596. Classes More Than 5 Students https://leetcode.com/problems/classes-more-than-5-students "There is a table courses with columns: student and class

Please list out all classes which have more than or equal to 5 students.

For example, the table:

```
+---------+------------+
| student | class      |
+---------+------------+
| A       | Math       |
| B       | English    |
| C       | Math       |
| D       | Biology    |
| E       | Math       |
| F       | Computer   |
| G       | Math       |
| H       | Math       |
| I       | Math       |
+---------+------------+
```

Should output:

```
+---------+
| class   |
+---------+
| Math    |
+---------+
```

Note:

The students should not be counted duplicate in each course."¿
598. Range Addition II https://leetcode.com/problems/range-addition-ii "Given an m * n matrix M initialized with all 0's and several update operations.
Operations are represented by a 2D array, and each operation is represented by an array with two positive integers a and b, which means M[i][j] should be added by one for all 0 <= i < a and 0 <= j < b.
You need to count and return the number of maximum integers in the matrix after performing all the operations.

Example 1:

Input:
m = 3, n = 3
operations = [[2,2],[3,3]]
Output: 4
Explanation:
Initially, M =
[[0, 0, 0],
 [0, 0, 0],
 [0, 0, 0]]

After performing [2,2], M =
[[1, 1, 0],
 [1, 1, 0],
 [0, 0, 0]]

After performing [3,3], M =
[[2, 2, 1],
 [2, 2, 1],
 [1, 1, 1]]

So the maximum integer in M is 2, and there are four of it in M. So return 4.

Note:

The range of m and n is [1,40000].
The range of a is [1,m], and the range of b is [1,n].
The range of operations size won't exceed 10,000."¿
599. Minimum Index Sum of Two Lists https://leetcode.com/problems/minimum-index-sum-of-two-lists "Suppose Andy and Doris want to choose a restaurant for dinner, and they both have a list of favorite restaurants represented by strings.

You need to help them find out their common interest with the least list index sum. If there is a choice tie between answers, output all of them with no order requirement. You could assume there always exists an answer.

Example 1:

Input:
[""Shogun"", ""Tapioca Express"", ""Burger King"", ""KFC""]
[""Piatti"", ""The Grill at Torrey Pines"", ""Hungry Hunter Steakhouse"", ""Shogun""]
Output: [""Shogun""]
Explanation: The only restaurant they both like is ""Shogun"".

Example 2:

Input:
[""Shogun"", ""Tapioca Express"", ""Burger King"", ""KFC""]
[""KFC"", ""Shogun"", ""Burger King""]
Output: [""Shogun""]
Explanation: The restaurant they both like and have the least index sum is ""Shogun"" with index sum 1 (0+1).

Note:

The length of both lists will be in the range of [1, 1000].
The length of strings in both lists will be in the range of [1, 30].
The index is starting from 0 to the list length minus 1.
No duplicates in both lists."¿
600. Non-negative Integers without Consecutive Ones https://leetcode.com/problems/non-negative-integers-without-consecutive-ones "Given a positive integer n, find the number of non-negative integers less than or equal to n, whose binary representations do NOT contain consecutive ones.

Example 1:

Input: 5
Output: 5
Explanation:
Here are the non-negative integers <= 5 with their corresponding binary representations:
0 : 0
1 : 1
2 : 10
3 : 11
4 : 100
5 : 101
Among them, only integer 3 disobeys the rule (two consecutive ones) and the other 5 satisfy the rule.

Note:
1 <= n <= 109"¿
601. Human Traffic of Stadium https://leetcode.com/problems/human-traffic-of-stadium "X city built a new stadium, each day many people visit it and the stats are saved as these columns: id, date, people

Please write a query to display the records which have 3 or more consecutive rows and the amount of people more than 100(inclusive).

For example, the table stadium:

id	date	people
1	2017-01-01	10
2	2017-01-02	109
3	2017-01-03	150
4	2017-01-04	99
5	2017-01-05	145
6	2017-01-06	1455
7	2017-01-07	199
8	2017-01-08	188

For the sample data above, the output is:

id	date	people
5	2017-01-05	145
6	2017-01-06	1455
7	2017-01-07	199
8	2017-01-08	188

Note:

Each day only have one row record, and the dates are increasing with id increasing."¿
605. Can Place Flowers https://leetcode.com/problems/can-place-flowers "Suppose you have a long flowerbed in which some of the plots are planted and some are not. However, flowers cannot be planted in adjacent plots - they would compete for water and both would die.

Given a flowerbed (represented as an array containing 0 and 1, where 0 means empty and 1 means not empty), and a number n, return if n new flowers can be planted in it without violating the no-adjacent-flowers rule.

Example 1:

Input: flowerbed = [1,0,0,0,1], n = 1
Output: True

Example 2:

Input: flowerbed = [1,0,0,0,1], n = 2
Output: False

Note:

The input array won't violate no-adjacent-flowers rule.
The input array size is in the range of [1, 20000].
n is a non-negative integer which won't exceed the input array size."¿
606. Construct String from Binary Tree https://leetcode.com/problems/construct-stri

ng-from-binary-tree "You need to construct a string consists of parenthesis and inte
gers from a binary tree with the preorder traversing way.

The null node needs to be represented by empty parenthesis pair ""()"". And you need
 to omit all the empty parenthesis pairs that don't affect the one-to-one mapping re
lationship between the string and the original binary tree.

Example 1:

Input: Binary tree: [1,2,3,4]
```
       1
     /   \
    2     3
   /
  4
```

Output: ""1(2(4))(3)""

Explanation: Originallay it needs to be ""1(2(4)())(3()())"",
but you need to omit all the unnecessary empty parenthesis pairs.
And it will be ""1(2(4))(3)"".

Example 2:

Input: Binary tree: [1,2,3,null,4]
```
       1
     /   \
    2     3
     \
      4
```

Output: ""1(2()(4))(3)""

Explanation: Almost the same as the first example,
except we can't omit the first parenthesis pair to break the one-to-one mapping rela
tionship between the input and the output."¿
609. Find Duplicate File in System https://leetcode.com/problems/find-duplicate-fil
e-in-system "Given a list of directory info including directory path, and all the fi
les with contents in this directory, you need to find out all the groups of duplicat
e files in the file system in terms of their paths.

A group of duplicate files consists of at least two files that have exactly the same
 content.

A single directory info string in the input list has the following format:
""root/d1/d2/.../dm f1.txt(f1_content) f2.txt(f2_content) ... fn.txt(fn_content)""

It means there are n files (f1.txt, f2.txt ... fn.txt with content f1_content, f2_co
ntent ... fn_content, respectively) in directory root/d1/d2/.../dm. Note that n >= 1
 and m >= 0. If m = 0, it means the directory is just the root directory.

The output is a list of group of duplicate file paths. For each group, it contains a
ll the file paths of the files that have the same content. A file path is a string t
hat has the following format:
""directory_path/file_name.txt""

Example 1:

Input:
[""root/a 1.txt(abcd) 2.txt(efgh)"", ""root/c 3.txt(abcd)"", ""root/c/d 4.txt(efgh)"
", ""root 4.txt(efgh)""]
Output:
[[""root/a/2.txt"",""root/c/d/4.txt"",""root/4.txt""],[""root/a/1.txt"",""root/c/3.t
xt""]]

Note:

No order is required for the final output.
You may assume the directory name, file name and file content only has letters and d
igits, and the length of file content is in the range of [1,50].
The number of files given is in the range of [1,20000].
You may assume no files or directories share the same name in the same directory.
You may assume each given directory info represents a unique directory. Directory pa
th and file info are separated by a single blank space.

Follow-up beyond contest:

Imagine you are given a real file system, how will you search files? DFS or BFS?
If the file content is very large (GB level), how will you modify your solution?
If you can only read the file by 1kb each time, how will you modify your solution?
What is the time complexity of your modified solution? What is the most time-consum
ing part and memory consuming part of it? How to optimize?
How to make sure the duplicated files you find are not false positive?"¿
611. Valid Triangle Number https://leetcode.com/problems/valid-triangle-number "Giv
en an array consists of non-negative integers, your task is to count the number of
triplets chosen from the array that can make triangles if we take them as side lengt
hs of a triangle.

Example 1:

Input: [2,2,3,4]
Output: 3
Explanation:
Valid combinations are:
2,3,4 (using the first 2)
2,3,4 (using the second 2)
2,2,3

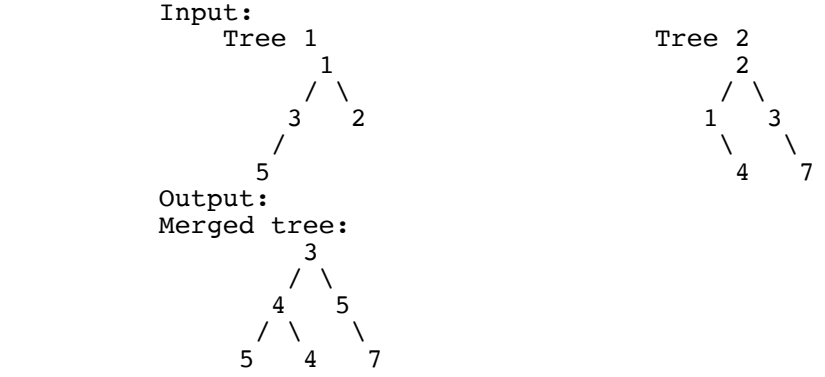
Note:

The length of the given array won't exceed 1000.
The integers in the given array are in the range of [0, 1000]."¿
617. Merge Two Binary Trees https://leetcode.com/problems/merge-two-binary-trees
"Given two binary trees and imagine that when you put one of them to cover the other
, some nodes of the two trees are overlapped while the others are not.

You need to merge them into a new binary tree. The merge rule is that if two nodes o
verlap, then sum node values up as the new value of the merged node. Otherwise, the
NOT null node will be used as the node of new tree.

Example 1:

Input:



Output:
Merged tree:

Note:
The merging process must start from the root nodes of both trees."¿
620. Not Boring Movies https://leetcode.com/problems/not-boring-movies "X city opened a new cinema, many people would like to go to this cinema.
The cinema also gives out a poster indicating the movies¿ ratings and descriptions.

Please write a SQL query to output movies with an odd numbered ID and a description that is not 'boring'. Order the result by rating.

For example, table cinema:

id	movie	description	rating
1	War	great 3D	8.9
2	Science	fiction	8.5
3	irish	boring	6.2
4	Ice song	Fantacy	8.6
5	House card	Interesting	9.1

For the example above, the output should be:

id	movie	description	rating
5	House card	Interesting	9.1
1	War	great 3D	8.9

"¿
621. Task Scheduler https://leetcode.com/problems/task-scheduler "Given a char array representing tasks CPU need to do. It contains capital letters A to Z where different letters represent different tasks.Tasks could be done without original order. Each task could be done in one interval. For each interval, CPU could finish one task or just be idle.

However, there is a non-negative cooling interval n that means between two same tasks, there must be at least n intervals that CPU are doing different tasks or just be idle.

You need to return the least number of intervals the CPU will take to finish all the given tasks.

Example 1:

Input: tasks = [""A"",""A"",""A"",""B"",""B"",""B""], n = 2
Output: 8
Explanation: A -> B -> idle -> A -> B -> idle -> A -> B.

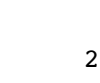
Note:

The number of tasks is in the range [1, 10000].
The integer n is in the range [0, 100]."¿
623. Add One Row to Tree https://leetcode.com/problems/add-one-row-to-tree "Given the root of a binary tree, then value v and depth d, you need to add a row of nodes with value v at the given depth d. The root node is at depth 1.

The adding rule is: given a positive integer depth d, for each NOT null tree nodes N in depth d-1, create two tree nodes with value v as N's left subtree root and right subtree root. And N's original left subtree should be the left subtree of the new left subtree root, its original right subtree should be the right subtree of the new right subtree root. If depth d is 1 that means there is no depth d-1 at all, then create a tree node with value v as the new root of the whole original tree, and the original tree is the new root's left subtree.

Example 1:

Input:
A binary tree as following:



```
   / \   /
  3   1 5
```

v = 1

d = 2

Output:

```
       4
      / \
     1   1
    /     \
   2       6
  / \     /
 3   1   5
```

Example 2:

Input:
A binary tree as following:

```
      4
     /
    2
   / \
  3   1
```

v = 1

d = 3

Output:

```
      4
     /
    2
   / \
  1   1
 /     \
3       1
```

Note:

The given d is in range [1, maximum depth of the given tree + 1].
The given binary tree has at least one tree node."¿
626. Exchange Seats https://leetcode.com/problems/exchange-seats "Mary is a teach
er in a middle school and she has a table seat storing students' names and their cor
responding seat ids.
The column id is continuous increment.
Mary wants to change seats for the adjacent students.
Can you write a SQL query to output the result for Mary?

id	student
1	Abbot
2	Doris
3	Emerson
4	Green
5	Jeames

For the sample input, the output is:

id	student
1	Doris
2	Abbot
3	Green

```
|    4    | Emerson |
|    5    | Jeames  |
+---------+---------+
```

Note:

If the number of students is odd, there is no need to change the last one's seat."¿
627. Swap Salary https://leetcode.com/problems/swap-salary "Given a table salar
y, such as the one below, that has m=male and f=female values. Swap all f and m val
ues (i.e., change all f values to m and vice versa) with a single update query and n
o intermediate temp table.

For example:

```
| id | name | sex | salary |
|----|------|-----|--------|
| 1  | A    | m   | 2500   |
| 2  | B    | f   | 1500   |
| 3  | C    | m   | 5500   |
| 4  | D    | f   | 500    |
```

After running your query, the above salary table should have the following rows:

```
| id | name | sex | salary |
|----|------|-----|--------|
| 1  | A    | f   | 2500   |
| 2  | B    | m   | 1500   |
| 3  | C    | f   | 5500   |
| 4  | D    | m   | 500    |
```

"¿
628. Maximum Product of Three Numbers https://leetcode.com/problems/maximum-produc
t-of-three-numbers "Given an integer array, find three numbers whose product is max
imum and output the maximum product.

Example 1:

```
Input: [1,2,3]
Output: 6
```

Example 2:

```
Input: [1,2,3,4]
Output: 24
```

Note:

The length of the given array will be in range [3,104] and all elements are in the r
ange [-1000, 1000].
Multiplication of any three numbers in the input won't exceed the range of 32-bit si
gned integer."¿
629. K Inverse Pairs Array https://leetcode.com/problems/k-inverse-pairs-array "Giv
en two integers n and k, find how many different arrays consist of numbers from 1 to
 n such that there are exactly k inverse pairs.

We define an inverse pair as following:
For ith and jth element in the array, if i < j and a[i] > a[j] then it's an inverse
pair; Otherwise, it's not.

Since the answer may be very large, the answer should be modulo 109 + 7.

Example 1:

```
Input: n = 3, k = 0
Output: 1
Explanation:
```

Only the array [1,2,3] which consists of numbers from 1 to 3 has exactly 0 inverse p
air.

Example 2:

Input: n = 3, k = 1
Output: 2
Explanation:
The array [1,3,2] and [2,1,3] have exactly 1 inverse pair.

Note:

The integer n is in the range [1, 1000] and k is in the range [0, 1000]."¿
630. Course Schedule III https://leetcode.com/problems/course-schedule-iii "The
re are n different online courses numbered from 1 to n. Each course has some duratio
n(course length) t and closed on dth day. A course should be taken continuously for
t days and must be finished before or on the dth day. You will start at the 1st day
.

Given n online courses represented by pairs (t,d), your task is to find the maximal
number of courses that can be taken.

Example:

Input: [[100, 200], [200, 1300], [1000, 1250], [2000, 3200]]
Output: 3
Explanation:
There're totally 4 courses, but you can take 3 courses at most:
First, take the 1st course, it costs 100 days so you will finish it on the 100th day
, and ready to take the next course on the 101st day.
Second, take the 3rd course, it costs 1000 days so you will finish it on the 1100th
day, and ready to take the next course on the 1101st day.
Third, take the 2nd course, it costs 200 days so you will finish it on the 1300th da
y.
The 4th course cannot be taken now, since you will finish it on the 3300th day, whic
h exceeds the closed date.

Note:

The integer 1 <= d, t, n <= 10,000.
You can't take two courses simultaneously."¿
632. Smallest Range https://leetcode.com/problems/smallest-range "You have k list
s of sorted integers in ascending order. Find the smallest range that includes at le
ast one number from each of the k lists.

We define the range [a,b] is smaller than range [c,d] if b-a < d-c or a < c if b-a =
= d-c.

Example 1:

Input:[[4,10,15,24,26], [0,9,12,20], [5,18,22,30]]
Output: [20,24]
Explanation:
List 1: [4, 10, 15, 24,26], 24 is in range [20,24].
List 2: [0, 9, 12, 20], 20 is in range [20,24].
List 3: [5, 18, 22, 30], 22 is in range [20,24].

Note:

The given list may contain duplicates, so ascending order means >= here.
1 <= k <= 3500
 -105 <= value of elements <= 105.
For Java users, please note that the input type has been changed to List<List<Integer>>. And after you reset the code template, you'll see this point."¿
633. Sum of Square Numbers https://leetcode.com/problems/sum-of-square-numbers "Given a non-negative integer c, your task is to decide whether there're two integers a and b such that a2 + b2 = c.

Example 1:

Input: 5
Output: True
Explanation: 1 * 1 + 2 * 2 = 5

Example 2:

Input: 3
Output: False"¿
636. Exclusive Time of Functions https://leetcode.com/problems/exclusive-time-of-functions "Given the running logs of n functions that are executed in a nonpreemptive single threaded CPU, find the exclusive time of these functions.

Each function has a unique id, start from 0 to n-1. A function may be called recursively or by another function.

A log is a string has this format : function_id:start_or_end:timestamp. For example, ""0:start:0"" means function 0 starts from the very beginning of time 0. ""0:end:0"" means function 0 ends to the very end of time 0.

Exclusive time of a function is defined as the time spent within this function, the time spent by calling other functions should not be considered as this function's exclusive time. You should return the exclusive time of each function sorted by their function id.

Example 1:

Input:
n = 2
logs =
[""0:start:0"",
 ""1:start:2"",
 ""1:end:5"",
 ""0:end:6""]
Output:[3, 4]
Explanation:
Function 0 starts at time 0, then it executes 2 units of time and reaches the end of time 1.
Now function 0 calls function 1, function 1 starts at time 2, executes 4 units of time and end at time 5.
Function 0 is running again at time 6, and also end at the time 6, thus executes 1 unit of time.
So function 0 totally execute 2 + 1 = 3 units of time, and function 1 totally execute 4 units of time.

Note:

Input logs will be sorted by timestamp, NOT log id.
Your output should be sorted by function id, which means the 0th element of your output corresponds to the exclusive time of function 0.
Two functions won't start or end at the same time.
Functions could be called recursively, and will always end.
1 <= n <= 100"¿

637. Average of Levels in Binary Tree https://leetcode.com/problems/average-of-levels-in-binary-tree "Given a non-empty binary tree, return the average value of the nodes on each level in the form of an array.

Example 1:

Input:
```
    3
   / \
  9  20
    /  \
   15   7
```
Output: [3, 14.5, 11]
Explanation:
The average value of nodes on level 0 is 3, on level 1 is 14.5, and on level 2 is 11. Hence return [3, 14.5, 11].

Note:

The range of node's value is in the range of 32-bit signed integer."¿
638. Shopping Offers https://leetcode.com/problems/shopping-offers "In LeetCode Store, there are some kinds of items to sell. Each item has a price.

However, there are some special offers, and a special offer consists of one or more different kinds of items with a sale price.

You are given the each item's price, a set of special offers, and the number we need to buy for each item.
The job is to output the lowest price you have to pay for exactly certain items as given, where you could make optimal use of the special offers.

Each special offer is represented in the form of an array, the last number represents the price you need to pay for this special offer, other numbers represents how many specific items you could get if you buy this offer.

You could use any of special offers as many times as you want.

Example 1:

Input: [2,5], [[3,0,5],[1,2,10]], [3,2]
Output: 14
Explanation:
There are two kinds of items, A and B. Their prices are $2 and $5 respectively.
In special offer 1, you can pay $5 for 3A and 0B
In special offer 2, you can pay $10 for 1A and 2B.
You need to buy 3A and 2B, so you may pay $10 for 1A and 2B (special offer #2), and $4 for 2A.

Example 2:

Input: [2,3,4], [[1,1,0,4],[2,2,1,9]], [1,2,1]
Output: 11
Explanation:
The price of A is $2, and $3 for B, $4 for C.
You may pay $4 for 1A and 1B, and $9 for 2A ,2B and 1C.
You need to buy 1A ,2B and 1C, so you may pay $4 for 1A and 1B (special offer #1), and $3 for 1B, $4 for 1C.
You cannot add more items, though only $9 for 2A ,2B and 1C.

Note:

There are at most 6 kinds of items, 100 special offers.
For each item, you need to buy at most 6 of them.
You are not allowed to buy more items than you want, even if that would lower the ov
erall price."¿
639. Decode Ways II https://leetcode.com/problems/decode-ways-ii "A message conta
ining letters from A-Z is being encoded to numbers using the following mapping way:

'A' -> 1
'B' -> 2
...
'Z' -> 26

Beyond that, now the encoded string can also contain the character '*', which can be
 treated as one of the numbers from 1 to 9.

Given the encoded message containing digits and the character '*', return the total
number of ways to decode it.

Also, since the answer may be very large, you should return the output mod 109 + 7.

Example 1:

Input: ""*""
Output: 9
Explanation: The encoded message can be decoded to the string: ""A"", ""B"", ""C"",
""D"", ""E"", ""F"", ""G"", ""H"", ""I"".

Example 2:

Input: ""1*""
Output: 9 + 9 = 18

Note:

The length of the input string will fit in range [1, 105].
The input string will only contain the character '*' and digits '0' - '9'."¿
640. Solve the Equation https://leetcode.com/problems/solve-the-equation "Solve a
 given equation and return the value of x in the form of string ""x=#value"". The eq
uation contains only '+', '-' operation, the variable x and its coefficient.

If there is no solution for the equation, return ""No solution"".

If there are infinite solutions for the equation, return ""Infinite solutions"".

If there is exactly one solution for the equation, we ensure that the value of x is
an integer.

Example 1:

Input: ""x+5-3+x=6+x-2""
Output: ""x=2""

Example 2:

Input: ""x=x""
Output: ""Infinite solutions""

Example 3:

Input: ""2x=x""
Output: ""x=0""

Example 4:

Input: ""2x+3x-6x=x+2""
Output: ""x=-1""

Example 5:

Input: ""x=x+2""
Output: ""No solution""¿
643. Maximum Average Subarray I https://leetcode.com/problems/maximum-average-subarray-i "Given an array consisting of n integers, find the contiguous subarray of given length k that has the maximum average value. And you need to output the maximum average value.

Example 1:

Input: [1,12,-5,-6,50,3], k = 4
Output: 12.75
Explanation: Maximum average is (12-5-6+50)/4 = 51/4 = 12.75

Note:

1 <= k <= n <= 30,000.
Elements of the given array will be in the range [-10,000, 10,000]."¿
645. Set Mismatch https://leetcode.com/problems/set-mismatch "The set S originally contains numbers from 1 to n. But unfortunately, due to the data error, one of the numbers in the set got duplicated to another number in the set, which results in repetition of one number and loss of another number.

Given an array nums representing the data status of this set after the error. Your task is to firstly find the number occurs twice and then find the number that is missing. Return them in the form of an array.

Example 1:

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

Note:

The given array size will in the range [2, 10000].
The given array's numbers won't have any order."¿
646. Maximum Length of Pair Chain https://leetcode.com/problems/maximum-length-of-

pair-chain "You are given n pairs of numbers. In every pair, the first number is al ways smaller than the second number.

Now, we define a pair (c, d) can follow another pair (a, b) if and only if b < c. Ch ain of pairs can be formed in this fashion.

Given a set of pairs, find the length longest chain which can be formed. You needn't use up all the given pairs. You can select pairs in any order.

Example 1:

Input: [[1,2], [2,3], [3,4]]
Output: 2
Explanation: The longest chain is [1,2] -> [3,4]

Note:

The number of given pairs will be in the range [1, 1000]."¿
647. Palindromic Substrings https://leetcode.com/problems/palindromic-substrings "Given a string, your task is to count how many palindromic substrings in this strin g.

The substrings with different start indexes or end indexes are counted as different substrings even they consist of same characters.

Example 1:

Input: ""abc""
Output: 3
Explanation: Three palindromic strings: ""a"", ""b"", ""c"".

Example 2:

Input: ""aaa""
Output: 6
Explanation: Six palindromic strings: ""a"", ""a"", ""a"", ""aa"", ""aa"", ""aaa"".

Note:

The input string length won't exceed 1000."¿
648. Replace Words https://leetcode.com/problems/replace-words "In English, we have a concept called root, which can be followed by some other words to form another lo nger word - let's call this word successor. For example, the root an, followed by ot her, which can form another word another.

Now, given a dictionary consisting of many roots and a sentence. You need to replace all the successor in the sentence with the root forming it. If a successor has many roots can form it, replace it with the root with the shortest length.

You need to output the sentence after the replacement.

Example 1:

Input: dict = [""cat"", ""bat"", ""rat""]
sentence = ""the cattle was rattled by the battery""
Output: ""the cat was rat by the bat""

Note:

The input will only have lower-case letters.
 1 <= dict words number <= 1000
 1 <= sentence words number <= 1000
 1 <= root length <= 100
 1 <= sentence words length <= 1000"¿
649. Dota2 Senate https://leetcode.com/problems/dota2-senate "In the world of Dot
a2, there are two parties: the Radiant and the Dire.

The Dota2 senate consists of senators coming from two parties. Now the senate wants
to make a decision about a change in the Dota2 game. The voting for this change is a
 round-based procedure. In each round, each senator can exercise one of the two righ
ts:

Ban one senator's right:
A senator can make another senator lose all his rights in this and all the following
 rounds.
Announce the victory:
If this senator found the senators who still have rights to vote are all from the sa
me party, he can announce the victory and make the decision about the change in the
game.

Given a string representing each senator's party belonging. The character 'R' and 'D
' represent the Radiant party and the Dire party respectively. Then if there are n s
enators, the size of the given string will be n.

The round-based procedure starts from the first senator to the last senator in the g
iven order. This procedure will last until the end of voting. All the senators who h
ave lost their rights will be skipped during the procedure.

Suppose every senator is smart enough and will play the best strategy for his own pa
rty, you need to predict which party will finally announce the victory and make the
change in the Dota2 game. The output should be Radiant or Dire.

Example 1:

Input: ""RD""
Output: ""Radiant""
Explanation: The first senator comes from Radiant and he can just ban the next senat
or's right in the round 1.
And the second senator can't exercise any rights any more since his right has been b
anned.
And in the round 2, the first senator can just announce the victory since he is the
only guy in the senate who can vote.

Example 2:

Input: ""RDD""
Output: ""Dire""
Explanation:
The first senator comes from Radiant and he can just ban the next senator's right in the round 1.
And the second senator can't exercise any rights anymore since his right has been banned.
And the third senator comes from Dire and he can ban the first senator's right in the round 1.
And in the round 2, the third senator can just announce the victory since he is the only guy in the senate who can vote.

Note:

The length of the given string will in the range [1, 10,000]."¿
650. 2 Keys Keyboard https://leetcode.com/problems/2-keys-keyboard "Initially on a notepad only one character 'A' is present. You can perform two operations on this notepad for each step:

Copy All: You can copy all the characters present on the notepad (partial copy is not allowed).
Paste: You can paste the characters which are copied last time.

Given a number n. You have to get exactly n 'A' on the notepad by performing the minimum number of steps permitted. Output the minimum number of steps to get n 'A'.

Example 1:

Input: 3
Output: 3
Explanation:
Intitally, we have one character 'A'.
In step 1, we use Copy All operation.
In step 2, we use Paste operation to get 'AA'.
In step 3, we use Paste operation to get 'AAA'.

Note:

The n will be in the range [1, 1000]."¿
652. Find Duplicate Subtrees https://leetcode.com/problems/find-duplicate-subtrees "Given a binary tree, return all duplicate subtrees. For each kind of duplicate subtrees, you only need to return the root node of any one of them.

Two trees are duplicate if they have the same structure with same node values.

Example 1:

```
        1
       / \
      2   3
     /   / \
    4   2   4
       /
      4
```

The following are two duplicate subtrees:

```
      2
     /
    4
```

and
    4

Therefore, you need to return above trees' root in the form of a list."¿
653. Two Sum IV - Input is a BST   https://leetcode.com/problems/two-sum-iv-input-is-a-bst "Given a Binary Search Tree and a target number, return true if there exist two elements in the BST such that their sum is equal to the given target.

Example 1:

Input:
```
    5
   / \
  3   6
 / \   \
2   4   7
```

Target = 9

Output: True

Example 2:

Input:
```
    5
   / \
  3   6
 / \   \
2   4   7
```

Target = 28

Output: False"¿
654. Maximum Binary Tree   https://leetcode.com/problems/maximum-binary-tree   "Given an integer array with no duplicates. A maximum tree building on this array is defined as follow:

The root is the maximum number in the array.
The left subtree is the maximum tree constructed from left part subarray divided by the maximum number.
The right subtree is the maximum tree constructed from right part subarray divided by the maximum number.

Construct the maximum tree by the given array and output the root node of this tree.

Example 1:

Input: [3,2,1,6,0,5]
Output: return the tree root node representing the following tree:

```
      6
    /   \
   3     5
    \    /
     2  0
       \
        1
```

Note:

The size of the given array will be in the range [1,1000]."¿
655. Print Binary Tree https://leetcode.com/problems/print-binary-tree "Print a binary tree in an m*n 2D string array following these rules:

The row number m should be equal to the height of the given binary tree.
The column number n should always be an odd number.
The root node's value (in string format) should be put in the exactly middle of the first row it can be put. The column and the row where the root node belongs will separate the rest space into two parts (left-bottom part and right-bottom part). You should print the left subtree in the left-bottom part and print the right subtree in the right-bottom part. The left-bottom part and the right-bottom part should have the same size. Even if one subtree is none while the other is not, you don't need to print anything for the none subtree but still need to leave the space as large as that for the other subtree. However, if two subtrees are none, then you don't need to leave space for both of them.
Each unused space should contain an empty string """".
Print the subtrees following the same rules.

Example 1:

Input:
```
     1
    /
   2
```
Output:
```
[["""", ""1"", """"],
 [""2"", """", """"]]
```

Example 2:

Input:
```
     1
    / \
   2   3
    \
     4
```
Output:
```
[["""", """", """", ""1"", """", """", """"],
 ["""", ""2"", """", """", """", ""3"", """"],
 ["""", """", ""4"", """", """", """", """"]]
```

Example 3:

Input:
```
      1
     / \
    2   5
   /
  3
 /
4
```
Output:

```
[["""",  """",  """", """",  """", """", """", ""1"", """",  """",  """",  """",  ""
"",  """",  """"]
 ["""",  """",  """", ""2"", """", """", """", """",  """",  """",  """",  ""5"", ""
"",  """",  """"]
 ["""",  ""3"", """", """",  """", """", """", """",  """",  """",  """",  """",  ""
"",  """",  """"]
 [""4"",  """",  """", """",  """", """", """", """",  """",  """",  """",  """",  ""
"",  """",  """"]]
```

Note:
The height of binary tree is in the range of [1, 10]."¿
657. Judge Route Circle https://leetcode.com/problems/judge-route-circle "Initially, there is a Robot at position (0, 0). Given a sequence of its moves, judge if this robot makes a circle, which means it moves back to the original place.

The move sequence is represented by a string. And each move is represent by a charac
ter. The valid robot moves are R (Right), L (Left), U (Up) and D (down). The output
should be true or false representing whether the robot makes a circle.

Example 1:

Input: ""UD""
Output: true

Example 2:

Input: ""LL""
Output: false"¿
658. Find K Closest Elements https://leetcode.com/problems/find-k-closest-element
s "Given a sorted array, two integers k and x, find the k closest elements to x in
the array. The result should also be sorted in ascending order.
If there is a tie, the smaller elements are always preferred.

Example 1:

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

Example 2:

Input: [1,2,3,4,5], k=4, x=-1
Output: [1,2,3,4]

Note:

The value k is positive and will always be smaller than the length of the sorted arr
ay.
Length of the given array is positive and will not exceed 104
Absolute value of elements in the array and x will not exceed 104

UPDATE (2017/9/19):

The arr parameter had been changed to an array of integers (instead of a list of int
egers). Please reload the code definition to get the latest changes."¿
659. Split Array into Consecutive Subsequences https://leetcode.com/problems/split-
array-into-consecutive-subsequences "You are given an integer array sorted in ascend
ing order (may contain duplicates), you need to split them into several subsequences
, where each subsequences consist of at least 3 consecutive integers. Return whether
you can make such a split.

Example 1:

Input: [1,2,3,3,4,5]
Output: True
Explanation:
You can split them into two consecutive subsequences :
1, 2, 3
3, 4, 5

Example 2:

```
Input: [1,2,3,3,4,4,5,5]
Output: True
Explanation:
You can split them into two consecutive subsequences :
1, 2, 3, 4, 5
3, 4, 5
```

Example 3:

```
Input: [1,2,3,4,4,5]
Output: False
```

Note:

The length of the input is in range of [1, 10000]"¿
661. Image Smoother https://leetcode.com/problems/image-smoother "Given a 2D integer matrix M representing the gray scale of an image, you need to design a smoother to make the gray scale of each cell becomes the average gray scale (rounding down) of all the 8 surrounding cells and itself. If a cell has less than 8 surrounding cells, then use as many as you can.

Example 1:

```
Input:
[[1,1,1],
 [1,0,1],
 [1,1,1]]
Output:
[[0, 0, 0],
 [0, 0, 0],
 [0, 0, 0]]
Explanation:
For the point (0,0), (0,2), (2,0), (2,2): floor(3/4) = floor(0.75) = 0
For the point (0,1), (1,0), (1,2), (2,1): floor(5/6) = floor(0.83333333) = 0
For the point (1,1): floor(8/9) = floor(0.88888889) = 0
```

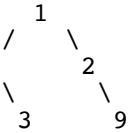
Note:

The value in the given matrix is in the range of [0, 255].
The length and width of the given matrix are in the range of [1, 150]."¿
662. Maximum Width of Binary Tree https://leetcode.com/problems/maximum-width-of-binary-tree "Given a binary tree, write a function to get the maximum width of the given tree. The width of a tree is the maximum width among all levels. The binary tree has the same structure as a full binary tree, but some nodes are null.

The width of one level is defined as the length between the end-nodes (the leftmost and right most non-null nodes in the level, where the null nodes between the end-nodes are also counted into the length calculation.

Example 1:

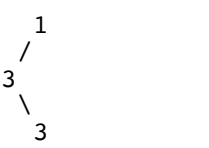
Input:



Output: 4
Explanation: The maximum width existing in the third level with the length 4 (5,3,null,9).

Example 2:

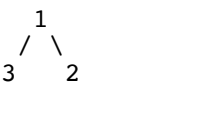
Input:



Output: 2
Explanation: The maximum width existing in the third level with the length 2 (5,3).

Example 3:

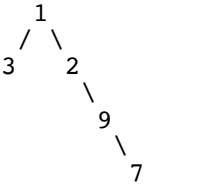
Input:



Output: 2
Explanation: The maximum width existing in the second level with the length 2 (3,2).

Example 4:

Input:



Output: 8
Explanation:The maximum width existing in the fourth level with the length 8 (6,null,null,null,null,null,null,7).

Note:
Answer will in the range of 32-bit signed integer."¿
664. Strange Printer https://leetcode.com/problems/strange-printer "There is a strange printer with the following two special requirements:

The printer can only print a sequence of the same character each time.
At each turn, the printer can print new characters starting from and ending at any places, and will cover the original existing characters.

Given a string consists of lower English letters only, your job is to count the minimum number of turns the printer needed in order to print it.

Example 1:

Input: ""aaabbb""
Output: 2
Explanation: Print ""aaa"" first and then print ""bbb"".

Example 2:

Input: ""aba""
Output: 2
Explanation: Print ""aaa"" first and then print ""b"" from the second place of the s
tring, which will cover the existing character 'a'.

Hint: Length of the given string will not exceed 100."¿
665. Non-decreasing Array https://leetcode.com/problems/non-decreasing-array "Giv
en an array with n integers, your task is to check if it could become non-decreasing
by modifying at most 1 element.

We define an array is non-decreasing if array[i] <= array[i + 1] holds for every i (
1 <= i < n).

Example 1:

Input: [4,2,3]
Output: True
Explanation: You could modify the first 4 to 1 to get a non-decreasing array.

Example 2:

Input: [4,2,1]
Output: False
Explanation: You can't get a non-decreasing array by modify at most one element.

Note:
The n belongs to [1, 10,000]."¿
667. Beautiful Arrangement II https://leetcode.com/problems/beautiful-arrangement-
ii "Given two integers n and k, you need to construct a list which contains n diffe
rent positive integers ranging from 1 to n and obeys the following requirement:

Suppose this list is [a1, a2, a3, ... , an], then the list [|a1 - a2|, |a2 - a3|, |a
3 - a4|, ... , |an-1 - an|] has exactly k distinct integers.

If there are multiple answers, print any of them.

Example 1:

Input: n = 3, k = 1
Output: [1, 2, 3]
Explanation: The [1, 2, 3] has three different positive integers ranging from 1 to 3
, and the [1, 1] has exactly 1 distinct integer: 1.

Example 2:

Input: n = 3, k = 2
Output: [1, 3, 2]
Explanation: The [1, 3, 2] has three different positive integers ranging from 1 to 3
, and the [2, 1] has exactly 2 distinct integers: 1 and 2.

Note:

The n and k are in the range 1 <= k < n <= 104."¿
668. Kth Smallest Number in Multiplication Table https://leetcode.com/problems/kth-smallest-number-in-multiplication-table "Nearly every one have used the Multiplication Table. But could you find out the k-th smallest number quickly from the multiplication table?

Given the height m and the length n of a m * n Multiplication Table, and a positive integer k, you need to return the k-th smallest number in this table.

Example 1:

Input: m = 3, n = 3, k = 5
Output:
Explanation:
The Multiplication Table:
1 2 3
2 4 6
3 6 9

The 5-th smallest number is 3 (1, 2, 2, 3, 3).

Example 2:

Input: m = 2, n = 3, k = 6
Output:
Explanation:
The Multiplication Table:
1 2 3
2 4 6

The 6-th smallest number is 6 (1, 2, 2, 3, 4, 6).

Note:

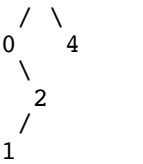
The m and n will be in the range [1, 30000].
The k will be in the range [1, m * n]"¿
669. Trim a Binary Search Tree https://leetcode.com/problems/trim-a-binary-search-tree "Given a binary search tree and the lowest and highest boundaries as L and R, trim the tree so that all its elements lies in [L, R] (R >= L). You might need to change the root of the tree, so the result should return the new root of the trimmed binary search tree.

Example 1:

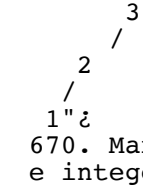
Input:
```
    1
   / \
  0   2

  L = 1
  R = 2
```

Output:
```
    1
     \
      2
```

Example 2:

Input:


L = 1
R = 3

Output:


1"¿
670. Maximum Swap https://leetcode.com/problems/maximum-swap "Given a non-negative integer, you could swap two digits at most once to get the maximum valued number. Return the maximum valued number you could get.

Example 1:

Input: 2736
Output: 7236
Explanation: Swap the number 2 and the number 7.

Example 2:

Input: 9973
Output: 9973
Explanation: No swap.

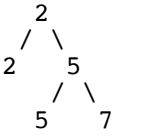
Note:

The given number is in the range [0, 108]"¿
671. Second Minimum Node In a Binary Tree https://leetcode.com/problems/second-minimum-node-in-a-binary-tree "Given a non-empty special binary tree consisting of nodes with the non-negative value, where each node in this tree has exactly two or zero sub-node. If the node has two sub-nodes, then this node's value is the smaller value among its two sub-nodes.

Given such a binary tree, you need to output the second minimum value in the set made of all the nodes' value in the whole tree.

If no such second minimum value exists, output -1 instead.

Example 1:

Input:


Output: 5
Explanation: The smallest value is 2, the second smallest value is 5.

Example 2:

Input:
```
    2
   / \
  2   2
```

Output: -1
Explanation: The smallest value is 2, but there isn't any second smallest value."¿
672. Bulb Switcher II https://leetcode.com/problems/bulb-switcher-ii "There is a room with n lights which are turned on initially and 4 buttons on the wall. After performing exactly m unknown operations towards buttons, you need to return how many different kinds of status of the n lights could be.

Suppose n lights are labeled as number [1, 2, 3 ..., n], function of these 4 buttons are given below:

Flip all the lights.
Flip lights with even numbers.
Flip lights with odd numbers.
Flip lights with (3k + 1) numbers, k = 0, 1, 2, ...

Example 1:

Input: n = 1, m = 1.
Output: 2
Explanation: Status can be: [on], [off]

Example 2:

Input: n = 2, m = 1.
Output: 3
Explanation: Status can be: [on, off], [off, on], [off, off]

Example 3:

Input: n = 3, m = 1.
Output: 4
Explanation: Status can be: [off, on, off], [on, off, on], [off, off, off], [off, on, on].

Note:
n and m both fit in range [0, 1000]."¿
673. Number of Longest Increasing Subsequence https://leetcode.com/problems/number-of-longest-increasing-subsequence "Given an unsorted array of integers, find the number of longest increasing subsequence.

Example 1:

Input: [1,3,5,4,7]
Output: 2
Explanation: The two longest increasing subsequence are [1, 3, 4, 7] and [1, 3, 5, 7].

Example 2:

Input: [2,2,2,2,2]
Output: 5
Explanation: The length of longest continuous increasing subsequence is 1, and there are 5 subsequences' length is 1, so output 5.

Note:
Length of the given array will be not exceed 2000 and the answer is guaranteed to be fit in 32-bit signed int."¿
674. Longest Continuous Increasing Subsequence https://leetcode.com/problems/longest-continuous-increasing-subsequence "Given an unsorted array of integers, find the length of longest continuous increasing subsequence (subarray).

Example 1:

Input: [1,3,5,4,7]
Output: 3
Explanation: The longest continuous increasing subsequence is [1,3,5], its length is 3.
Even though [1,3,5,7] is also an increasing subsequence, it's not a continuous one where 5 and 7 are separated by 4.

Example 2:

Input: [2,2,2,2,2]
Output: 1
Explanation: The longest continuous increasing subsequence is [2], its length is 1.

Note:
Length of the array will not exceed 10,000."¿
675. Cut Off Trees for Golf Event https://leetcode.com/problems/cut-off-trees-for-golf-event "You are asked to cut off trees in a forest for a golf event. The forest is represented as a non-negative 2D map, in this map:

0 represents the obstacle can't be reached.
1 represents the ground can be walked through.
The place with number bigger than 1 represents a tree can be walked through, and this positive number represents the tree's height.

You are asked to cut off all the trees in this forest in the order of tree's height - always cut off the tree with lowest height first. And after cutting, the original place has the tree will become a grass (value 1).

You will start from the point (0, 0) and you should output the minimum steps you need to walk to cut off all the trees. If you can't cut off all the trees, output -1 in that situation.

You are guaranteed that no two trees have the same height and there is at least one tree needs to be cut off.

Example 1:

Input:
[
 [1,2,3],
 [0,0,4],
 [7,6,5]

]
Output: 6

Example 2:

Input:
[
 [1,2,3],
 [0,0,0],
 [7,6,5]
]
Output: -1

Example 3:

Input:
[
 [2,3,4],
 [0,0,5],
 [8,7,6]
]
Output: 6
Explanation: You started from the point (0,0) and you can cut off the tree in (0,0) directly without walking.

Hint: size of the given matrix will not exceed 50x50."¿
676. Implement Magic Dictionary https://leetcode.com/problems/implement-magic-dictionary "Implement a magic directory with buildDict, and search methods.

For the method buildDict, you'll be given a list of non-repetitive words to build a dictionary.

For the method search, you'll be given a word, and judge whether if you modify exactly one character into another character in this word, the modified word is in the dictionary you just built.

Example 1:

Input: buildDict([""hello"", ""leetcode""]), Output: Null
Input: search(""hello""), Output: False
Input: search(""hhllo""), Output: True
Input: search(""hell""), Output: False
Input: search(""leetcoded""), Output: False

Note:

You may assume that all the inputs are consist of lowercase letters a-z.
For contest purpose, the test data is rather small by now. You could think about highly efficient algorithm after the contest.
Please remember to RESET your class variables declared in class MagicDictionary, as static/class variables are persisted across multiple test cases. Please see here for more details."¿
677. Map Sum Pairs https://leetcode.com/problems/map-sum-pairs "Implement a MapSum class with insert, and sum methods.

For the method insert, you'll be given a pair of (string, integer). The string repre

sents the key and the integer represents the value. If the key already existed, then the original key-value pair will be overridden to the new one.

For the method sum, you'll be given a string representing the prefix, and you need to return the sum of all the pairs' value whose key starts with the prefix.

Example 1:

Input: insert(""apple"", 3), Output: Null
Input: sum(""ap""), Output: 3
Input: insert(""app"", 2), Output: Null
Input: sum(""ap""), Output: 5"¿
678. Valid Parenthesis String https://leetcode.com/problems/valid-parenthesis-string "Given a string containing only three types of characters: '(', ')' and '*', write a function to check whether this string is valid. We define the validity of a string by these rules:

Any left parenthesis '(' must have a corresponding right parenthesis ')'.
Any right parenthesis ')' must have a corresponding left parenthesis '('.
Left parenthesis '(' must go before the corresponding right parenthesis ')'.
'*' could be treated as a single right parenthesis ')' or a single left parenthesis '(' or an empty string.
An empty string is also valid.

Example 1:

Input: ""()""
Output: True

Example 2:

Input: ""(*)""
Output: True

Example 3:

Input: ""(*))""
Output: True

Note:

The string size will be in the range [1, 100]."¿
679. 24 Game https://leetcode.com/problems/24-game "You have 4 cards each containing a number from 1 to 9. You need to judge whether they could operated through *, /, +, -, (,) to get the value of 24.

Example 1:

Input: [4, 1, 8, 7]
Output: True
Explanation: (8-4) * (7-1) = 24

Example 2:

Input: [1, 2, 1, 2]
Output: False

Note:

The division operator / represents real division, not integer division. For example, 4 / (1 - 2/3) = 12.
Every operation done is between two numbers. In particular, we cannot use - as a unary operator. For example, with [1, 1, 1, 1] as input, the expression -1 - 1 - 1 - 1 is not allowed.
You cannot concatenate numbers together. For example, if the input is [1, 2, 1, 2], we cannot write this as 12 + 12."¿
680. Valid Palindrome II https://leetcode.com/problems/valid-palindrome-ii "Given a non-empty string s, you may delete at most one character. Judge whether you can make it a palindrome.

Example 1:

Input: ""aba""
Output: True

Example 2:

Input: ""abca""
Output: True
Explanation: You could delete the character 'c'.

Note:

The string will only contain lowercase characters a-z.
The maximum length of the string is 50000."¿
682. Baseball Game https://leetcode.com/problems/baseball-game "You're now a baseball game point recorder.

Given a list of strings, each string can be one of the 4 following types:

Integer (one round's score): Directly represents the number of points you get in this round.
""+"" (one round's score): Represents that the points you get in this round are the sum of the last two valid round's points.
""D"" (one round's score): Represents that the points you get in this round are the doubled data of the last valid round's points.
""C"" (an operation, which isn't a round's score): Represents the last valid round's points you get were invalid and should be removed.

Each round's operation is permanent and could have an impact on the round before and the round after.

You need to return the sum of the points you could get in all the rounds.

Example 1:

Input: [""5"",""2"",""C"",""D"",""+""]
Output: 30
Explanation:
Round 1: You could get 5 points. The sum is: 5.
Round 2: You could get 2 points. The sum is: 7.
Operation 1: The round 2's data was invalid. The sum is: 5.
Round 3: You could get 10 points (the round 2's data has been removed). The sum is: 15.

Round 4: You could get 5 + 10 = 15 points. The sum is: 30.

Example 2:

Input: [""5"",""-2"",""4"",""C"",""D"",""9"",""+"",""+""]
Output: 27
Explanation:
Round 1: You could get 5 points. The sum is: 5.
Round 2: You could get -2 points. The sum is: 3.
Round 3: You could get 4 points. The sum is: 7.
Operation 1: The round 3's data is invalid. The sum is: 3.
Round 4: You could get -4 points (the round 3's data has been removed). The sum is: -1.
Round 5: You could get 9 points. The sum is: 8.
Round 6: You could get -4 + 9 = 5 points. The sum is 13.
Round 7: You could get 9 + 5 = 14 points. The sum is 27.

Note:

The size of the input list will be between 1 and 1000.
Every integer represented in the list will be between -30000 and 30000."¿
684. Redundant Connection https://leetcode.com/problems/redundant-connection "In this problem, a tree is an undirected graph that is connected and has no cycles.

The given input is a graph that started as a tree with N nodes (with distinct values 1, 2, ..., N), with one additional edge added. The added edge has two different vertices chosen from 1 to N, and was not an edge that already existed.

The resulting graph is given as a 2D-array of edges. Each element of edges is a pair [u, v] with u < v, that represents an undirected edge connecting nodes u and v.

Return an edge that can be removed so that the resulting graph is a tree of N nodes. If there are multiple answers, return the answer that occurs last in the given 2D-array. The answer edge [u, v] should be in the same format, with u < v.
Example 1:

Input: [[1,2], [1,3], [2,3]]
Output: [2,3]
Explanation: The given undirected graph will be like this:
```
  1
 / \
2 - 3
```

Example 2:

Input: [[1,2], [2,3], [3,4], [1,4], [1,5]]
Output: [1,4]
Explanation: The given undirected graph will be like this:
```
5 - 1 - 2
    |   |
    4 - 3
```

Note:

The size of the input 2D-array will be between 3 and 1000.
Every integer represented in the 2D-array will be between 1 and N, where N is the size of the input array.

Update (2017-09-26):

We have overhauled the problem description + test cases and specified clearly the graph is an undirected graph. For the directed graph follow up please see Redundant Co

nnection II). We apologize for any inconvenience caused."¿
685. Redundant Connection II https://leetcode.com/problems/redundant-connection-ii "In this problem, a rooted tree is a directed graph such that, there is exactly one node (the root) for which all other nodes are descendants of this node, plus every node has exactly one parent, except for the root node which has no parents.

The given input is a directed graph that started as a rooted tree with N nodes (with distinct values 1, 2, ..., N), with one additional directed edge added. The added edge has two different vertices chosen from 1 to N, and was not an edge that already existed.

The resulting graph is given as a 2D-array of edges. Each element of edges is a pair [u, v] that represents a directed edge connecting nodes u and v, where u is a parent of child v.

Return an edge that can be removed so that the resulting graph is a rooted tree of N nodes. If there are multiple answers, return the answer that occurs last in the given 2D-array.
Example 1:

```
Input: [[1,2], [1,3], [2,3]]
Output: [2,3]
Explanation: The given directed graph will be like this:
  1
 / \
v   v
2-->3
```

Example 2:

```
Input: [[1,2], [2,3], [3,4], [4,1], [1,5]]
Output: [4,1]
Explanation: The given directed graph will be like this:
5 <- 1 -> 2
     ^    |
     |    v
     4 <- 3
```

Note:

The size of the input 2D-array will be between 3 and 1000.
Every integer represented in the 2D-array will be between 1 and N, where N is the size of the input array."¿
686. Repeated String Match https://leetcode.com/problems/repeated-string-match "Given two strings A and B, find the minimum number of times A has to be repeated such that B is a substring of it. If no such solution, return -1.

For example, with A = ""abcd"" and B = ""cdabcdab"".

Return 3, because by repeating A three times (¿abcdabcdabcd¿), B is a substring of it; and B is not a substring of A repeated two times (""abcdabcd"").

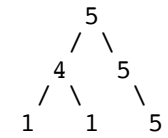
Note:

The length of A and B will be between 1 and 10000."¿
687. Longest Univalue Path https://leetcode.com/problems/longest-univalue-path "Given a binary tree, find the length of the longest path where each node in the path has the same value. This path may or may not pass through the root.

Note: The length of path between two nodes is represented by the number of edges between them.

Example 1:

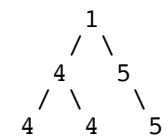
Input:



Output:
2

Example 2:

Input:



Output:
2

Note:
The given binary tree has not more than 10000 nodes. The height of the tree is not more than 1000."¿
688. Knight Probability in Chessboard https://leetcode.com/problems/knight-probability-in-chessboard "On an NxN chessboard, a knight starts at the r-th row and c-th column and attempts to make exactly K moves. The rows and columns are 0 indexed, so the top-left square is (0, 0), and the bottom-right square is (N-1, N-1).

A chess knight has 8 possible moves it can make, as illustrated below. Each move is two squares in a cardinal direction, then one square in an orthogonal direction.

Each time the knight is to move, it chooses one of eight possible moves uniformly at random (even if the piece would go off the chessboard) and moves there.

The knight continues moving until it has made exactly K moves or has moved off the chessboard. Return the probability that the knight remains on the board after it has stopped moving.

Example:

Input: 3, 2, 0, 0
Output: 0.0625
Explanation: There are two moves (to (1,2), (2,1)) that will keep the knight on the board.
From each of those positions, there are also two moves that will keep the knight on the board.
The total probability the knight stays on the board is 0.0625.

Note:

N will be between 1 and 25.
K will be between 0 and 100.
The knight always initially starts on the board."¿
689. Maximum Sum of 3 Non-Overlapping Subarrays https://leetcode.com/problems/maximum-sum-of-3-non-overlapping-subarrays "In a given array nums of positive integers, find three non-overlapping subarrays with maximum sum.

Each subarray will be of size k, and we want to maximize the sum of all 3*k entries.

Return the result as a list of indices representing the starting position of each interval (0-indexed). If there are multiple answers, return the lexicographically smallest one.

Example:

Input: [1,2,1,2,6,7,5,1], 2
Output: [0, 3, 5]
Explanation: Subarrays [1, 2], [2, 6], [7, 5] correspond to the starting indices [0, 3, 5].
We could have also taken [2, 1], but an answer of [1, 3, 5] would be lexicographically larger.

Note:

nums.length will be between 1 and 20000.
nums[i] will be between 1 and 65535.
k will be between 1 and floor(nums.length / 3)."¿
690. Employee Importance https://leetcode.com/problems/employee-importance "You are given a data structure of employee information, which includes the employee's unique id, his importance value and his direct subordinates' id.

For example, employee 1 is the leader of employee 2, and employee 2 is the leader of employee 3. They have importance value 15, 10 and 5, respectively. Then employee 1 has a data structure like [1, 15, [2]], and employee 2 has [2, 10, [3]], and employee 3 has [3, 5, []]. Note that although employee 3 is also a subordinate of employee 1, the relationship is not direct.

Now given the employee information of a company, and an employee id, you need to return the total importance value of this employee and all his subordinates.

Example 1:

Input: [[1, 5, [2, 3]], [2, 3, []], [3, 3, []]], 1
Output: 11
Explanation:
Employee 1 has importance value 5, and he has two direct subordinates: employee 2 and employee 3. They both have importance value 3. So the total importance value of employee 1 is 5 + 3 + 3 = 11.

Note:

One employee has at most one direct leader and may have several subordinates.
The maximum number of employees won't exceed 2000."¿
691. Stickers to Spell Word https://leetcode.com/problems/stickers-to-spell-word "We are given N different types of stickers. Each sticker has a lowercase English word on it.

You would like to spell out the given target string by cutting individual letters from your collection of stickers and rearranging them.

You can use each sticker more than once if you want, and you have infinite quantities of each sticker.

What is the minimum number of stickers that you need to spell out the target? If th
e task is impossible, return -1.

Example 1:
Input:[""with"", ""example"", ""science""], ""thehat""

Output:3

Explanation:We can use 2 ""with"" stickers, and 1 ""example"" sticker.
After cutting and rearrange the letters of those stickers, we can form the target ""
thehat"".
Also, this is the minimum number of stickers necessary to form the target string.

Example 2:
Input:[""notice"", ""possible""], ""basicbasic""

Output:-1

Explanation:We can't form the target ""basicbasic"" from cutting letters from the gi
ven stickers.

Note:
stickers has length in the range [1, 50].
stickers consists of lowercase English words (without apostrophes).
target has length in the range [1, 15], and consists of lowercase English letters.
In all test cases, all words were chosen randomly from the 1000 most common US Engli
sh words, and the target was chosen as a concatenation of two random words.
The time limit may be more challenging than usual. It is expected that a 50 sticker
test case can be solved within 35ms on average."¿
692. Top K Frequent Words https://leetcode.com/problems/top-k-frequent-words "Giv
en a non-empty list of words, return the k most frequent elements.
Your answer should be sorted by frequency from highest to lowest. If two words have
the same frequency, then the word with the lower alphabetical order comes first.

Example 1:

Input: [""i"", ""love"", ""leetcode"", ""i"", ""love"", ""coding""], k = 2
Output: [""i"", ""love""]
Explanation: ""i"" and ""love"" are the two most frequent words.
    Note that ""i"" comes before ""love"" due to a lower alphabetical order.

Example 2:

Input: [""the"", ""day"", ""is"", ""sunny"", ""the"", ""the"", ""the"", ""sunny"", ""
""is"", ""is""], k = 4
Output: [""the"", ""is"", ""sunny"", ""day""]
Explanation: ""the"", ""is"", ""sunny"" and ""day"" are the four most frequent words
,
    with the number of occurrence being 4, 3, 2 and 1 respectively.

Note:

You may assume k is always valid, 1 ¿ k ¿ number of unique elements.
Input words contain only lowercase letters.

Follow up:

Try to solve it in O(n log k) time and O(n) extra space."¿
693. Binary Number with Alternating Bits https://leetcode.com/problems/binary-number-with-alternating-bits "Given a positive integer, check whether it has alternating bits: namely, if two adjacent bits will always have different values.

Example 1:

Input: 5
Output: True
Explanation:
The binary representation of 5 is: 101

Example 2:

Input: 7
Output: False
Explanation:
The binary representation of 7 is: 111.

Example 3:

Input: 11
Output: False
Explanation:
The binary representation of 11 is: 1011.

Example 4:

Input: 10
Output: True
Explanation:
The binary representation of 10 is: 1010."¿
695. Max Area of Island https://leetcode.com/problems/max-area-of-island "Given a non-empty 2D array grid of 0's and 1's, an island is a group of 1's (representing land) connected 4-directionally (horizontal or vertical.) You may assume all four edges of the grid are surrounded by water.

Find the maximum area of an island in the given 2D array.
(If there is no island, the maximum area is 0.)

Example 1:

```
[[0,0,1,0,0,0,0,1,0,0,0,0,0],
 [0,0,0,0,0,0,0,1,1,1,0,0,0],
 [0,1,1,0,1,0,0,0,0,0,0,0,0],
 [0,1,0,0,1,1,0,0,1,0,1,0,0],
 [0,1,0,0,1,1,0,0,1,1,1,0,0],
 [0,0,0,0,0,0,0,0,0,0,1,0,0],
 [0,0,0,0,0,0,0,1,1,1,0,0,0],
 [0,0,0,0,0,0,0,1,1,0,0,0,0]]
```

Given the above grid, return 6.

Note the answer is not 11, because the island must be connected 4-directionally.

Example 2:

```
[[0,0,0,0,0,0,0,0]]
```
Given the above grid, return 0.

Note:
The length of each dimension in the given grid does not exceed 50."¿
696. Count Binary Substrings https://leetcode.com/problems/count-binary-substrings "Give a string s, count the number of non-empty (contiguous) substrings that have the same number of 0's and 1's, and all the 0's and all the 1's in these substring

s are grouped consecutively.

Substrings that occur multiple times are counted the number of times they occur.

Example 1:

Input: ""00110011""
Output: 6
Explanation: There are 6 substrings that have equal number of consecutive 1's and 0's: ""0011"", ""01"", ""1100"", ""10"", ""0011"", and ""01"".

Notice that some of these substrings repeat and are counted the number of times they occur.

Also, ""00110011"" is not a valid substring because all the 0's (and 1's) are not grouped together.

Example 2:

Input: ""10101""
Output: 4
Explanation: There are 4 substrings: ""10"", ""01"", ""10"", ""01"" that have equal number of consecutive 1's and 0's.

Note:
s.length will be between 1 and 50,000.
s will only consist of ""0"" or ""1"" characters."¿
697. Degree of an Array https://leetcode.com/problems/degree-of-an-array "Given a non-empty array of non-negative integers nums, the degree of this array is defined as the maximum frequency of any one of its elements.
Your task is to find the smallest possible length of a (contiguous) subarray of nums, that has the same degree as nums.

Example 1:

Input: [1, 2, 2, 3, 1]
Output: 2
Explanation:
The input array has a degree of 2 because both elements 1 and 2 appear twice.
Of the subarrays that have the same degree:
[1, 2, 2, 3, 1], [1, 2, 2, 3], [2, 2, 3, 1], [1, 2, 2], [2, 2, 3], [2, 2]
The shortest length is 2. So return 2.

Example 2:

Input: [1,2,2,3,1,4,2]
Output: 6

Note:
nums.length will be between 1 and 50,000.
nums[i] will be an integer between 0 and 49,999."¿
698. Partition to K Equal Sum Subsets https://leetcode.com/problems/partition-to-k-equal-sum-subsets "Given an array of integers nums and a positive integer k, find whether it's possible to divide this array into k non-empty subsets whose sums are all equal.

Example 1:

Input: nums = [4, 3, 2, 3, 5, 2, 1], k = 4
Output: True
Explanation: It's possible to divide it into 4 subsets (5), (1, 4), (2,3), (2,3) with equal sums.

Note:
1 <= k <= len(nums) <= 16.
0 < nums[i] < 10000."¿
699. Falling Squares https://leetcode.com/problems/falling-squares "On an infin
ite number line (x-axis), we drop given squares in the order they are given.
The i-th square dropped (positions[i] = (left, side_length)) is a square with the le
ft-most point being positions[i][0] and sidelength positions[i][1].
The square is dropped with the bottom edge parallel to the number line, and from a h
igher height than all currently landed squares. We wait for each square to stick be
fore dropping the next.
The squares are infinitely sticky on their bottom edge, and will remain fixed to any
positive length surface they touch (either the number line or another square). Squ
ares dropped adjacent to each other will not stick together prematurely.

Return a list ans of heights. Each height ans[i] represents the current highest hei
ght of any square we have dropped, after dropping squares represented by positions[0
], positions[1], ..., positions[i].

Example 1:

Input: [[1, 2], [2, 3], [6, 1]]
Output: [2, 5, 5]
Explanation:

After the first drop of positions[0] = [1, 2]:
_aa
_aa

The maximum height of any square is 2.

After the second drop of positions[1] = [2, 3]:
__aaa
__aaa
__aaa
_aa__
_aa__

The maximum height of any square is 5.
The larger square stays on top of the smaller square despite where its center
of gravity is, because squares are infinitely sticky on their bottom edge.

After the third drop of positions[1] = [6, 1]:
__aaa
__aaa
__aaa
_aa
_aa___a

The maximum height of any square is still 5.

Thus, we return an answer of [2, 5, 5].

Example 2:

Input: [[100, 100], [200, 100]]
Output: [100, 100]
Explanation: Adjacent squares don't get stuck prematurely - only their bottom edge c
an stick to surfaces.

Note:
1 <= positions.length <= 1000.
1 <= positions[i][0] <= 10^8.

1 <= positions[i][1] <= 10^6."¿
712. Minimum ASCII Delete Sum for Two Strings https://leetcode.com/problems/minimum-ascii-delete-sum-for-two-strings "Given two strings s1, s2, find the lowest ASCII sum of deleted characters to make two strings equal.

Example 1:

Input: s1 = ""sea"", s2 = ""eat""
Output: 231
Explanation: Deleting ""s"" from ""sea"" adds the ASCII value of ""s"" (115) to the sum.
Deleting ""t"" from ""eat"" adds 116 to the sum.
At the end, both strings are equal, and 115 + 116 = 231 is the minimum sum possible to achieve this.

Example 2:

Input: s1 = ""delete"", s2 = ""leet""
Output: 403
Explanation: Deleting ""dee"" from ""delete"" to turn the string into ""let"",
adds 100[d]+101[e]+101[e] to the sum. Deleting ""e"" from ""leet"" adds 101[e] to the sum.
At the end, both strings are equal to ""let"", and the answer is 100+101+101+101 = 403.
If instead we turned both strings into ""lee"" or ""eet"", we would get answers of 433 or 417, which are higher.

Note:
0 < s1.length, s2.length <= 1000.
All elements of each string will have an ASCII value in [97, 122]."¿
713. Subarray Product Less Than K https://leetcode.com/problems/subarray-product-less-than-k "Your are given an array of positive integers nums.
Count and print the number of (contiguous) subarrays where the product of all the elements in the subarray is less than k.

Example 1:

Input: nums = [10, 5, 2, 6], k = 100
Output: 8
Explanation: The 8 subarrays that have product less than 100 are: [10], [5], [2], [6], [10, 5], [5, 2], [2, 6], [5, 2, 6].
Note that [10, 5, 2] is not included as the product of 100 is not strictly less than k.

Note:
0 < nums.length <= 50000.
0 < nums[i] < 1000.
0 <= k < 10^6."¿
714. Best Time to Buy and Sell Stock with Transaction Fee https://leetcode.com/problems/best-time-to-buy-and-sell-stock-with-transaction-fee "Your are given an array of integers prices, for which the i-th element is the price of a given stock on day i; and a non-negative integer fee representing a transaction fee.
You may complete as many transactions as you like, but you need to pay the transaction fee for each transaction. You may not buy more than 1 share of a stock at a time (ie. you must sell the stock share before you buy again.)
Return the maximum profit you can make.

Example 1:

Input: prices = [1, 3, 2, 8, 4, 9], fee = 2
Output: 8
Explanation: The maximum profit can be achieved by:
Buying at prices[0] = 1Selling at prices[3] = 8Buying at prices[4] = 4Selling at prices[5] = 9The total profit is ((8 - 1) - 2) + ((9 - 4) - 2) = 8.

Note:
0 < prices.length <= 50000.
0 < prices[i] < 50000.
0 <= fee < 50000."¿
715. Range Module https://leetcode.com/problems/range-module "A Range Module is a
module that tracks ranges of numbers. Your task is to design and implement the foll
owing interfaces in an efficient manner.

addRange(int left, int right) Adds the half-open interval [left, right), tracking ev
ery real number in that interval. Adding an interval that partially overlaps with c
urrently tracked numbers should add any numbers in the interval [left, right) that a
re not already tracked.

queryRange(int left, int right) Returns true if and only if every real number in the
interval [left, right)
is currently being tracked.

removeRange(int left, int right) Stops tracking every real number currently being tr
acked in the interval [left, right).

Example 1:

addRange(10, 20): null
removeRange(14, 16): null
queryRange(10, 14): true (Every number in [10, 14) is being tracked)
queryRange(13, 15): false (Numbers like 14, 14.03, 14.17 in [13, 15) are not being t
racked)
queryRange(16, 17): true (The number 16 in [16, 17) is still being tracked, despite
the remove operation)

Note:
A half open interval [left, right) denotes all real numbers left <= x < right.

0 < left < right < 10^9 in all calls to addRange, queryRange, removeRange.
The total number of calls to addRange in a single test case is at most 1000.
The total number of calls to queryRange in a single test case is at most 5000.
The total number of calls to removeRange in a single test case is at most 1000."¿
717. 1-bit and 2-bit Characters https://leetcode.com/problems/1-bit-and-2-bit-charac
ters "We have two special characters. The first character can be represented by o
ne bit 0. The second character can be represented by two bits (10 or 11).

Now given a string represented by several bits. Return whether the last character mu
st be a one-bit character or not. The given string will always end with a zero.

Example 1:

Input:
bits = [1, 0, 0]
Output: True
Explanation:
The only way to decode it is two-bit character and one-bit character. So the last ch
aracter is one-bit character.

Example 2:

Input:
bits = [1, 1, 1, 0]
Output: False
Explanation:
The only way to decode it is two-bit character and two-bit character. So the last ch
aracter is NOT one-bit character.

Note:
1 <= len(bits) <= 1000.
bits[i] is always 0 or 1."¿
718. Maximum Length of Repeated Subarray https://leetcode.com/problems/maximum-le
ngth-of-repeated-subarray "Given two integer arrays A and B, return the maximum le

ngth of an subarray that appears in both arrays.

Example 1:

Input:
A: [1,2,3,2,1]
B: [3,2,1,4,7]
Output: 3
Explanation:
The repeated subarray with maximum length is [3, 2, 1].

Note:

1 <= len(A), len(B) <= 1000
0 <= A[i], B[i] < 100"¿
719. Find K-th Smallest Pair Distance https://leetcode.com/problems/find-k-th-smallest-pair-distance "Given an integer array, return the k-th smallest distance among all the pairs. The distance of a pair (A, B) is defined as the absolute difference between A and B.

Example 1:

Input:
nums = [1,3,1]
k = 1
Output: 0
Explanation:
Here are all the pairs:
(1,3) -> 2
(1,1) -> 0
(3,1) -> 2
Then the 1st smallest distance pair is (1,1), and its distance is 0.

Note:

2 <= len(nums) <= 10000.
0 <= nums[i] < 1000000.
1 <= k <= len(nums) * (len(nums) - 1) / 2."¿
720. Longest Word in Dictionary https://leetcode.com/problems/longest-word-in-dictionary "Given a list of strings words representing an English Dictionary, find the longest word in words that can be built one character at a time by other words in words. If there is more than one possible answer, return the longest word with the smallest lexicographical order. If there is no answer, return the empty string.

Example 1:

Input:
words = [""w"",""wo"",""wor"",""worl"", ""world""]
Output: ""world""
Explanation:
The word ""world"" can be built one character at a time by ""w"", ""wo"", ""wor"", and ""worl"".

Example 2:

Input:
words = [""a"", ""banana"", ""app"", ""appl"", ""ap"", ""apply"", ""apple""]
Output: ""apple""
Explanation:
Both ""apply"" and ""apple"" can be built from other words in the dictionary. However, ""apple"" is lexicographically smaller than ""apply"".

Note:

All the strings in the input will only contain lowercase letters.
The length of words will be in the range [1, 1000].
The length of words[i] will be in the range [1, 30]."¿
721. Accounts Merge https://leetcode.com/problems/accounts-merge "Given a list ac
counts, each element accounts[i] is a list of strings, where the first element accou
nts[i][0] is a name, and the rest of the elements are emails representing emails of
the account.

Now, we would like to merge these accounts. Two accounts definitely belong to the s
ame person if there is some email that is common to both accounts. Note that even i
f two accounts have the same name, they may belong to different people as people cou
ld have the same name. A person can have any number of accounts initially, but all
of their accounts definitely have the same name.

After merging the accounts, return the accounts in the following format: the first e
lement of each account is the name, and the rest of the elements are emails in sorte
d order. The accounts themselves can be returned in any order.

Example 1:

Input:
accounts = [[""John"", ""johnsmith@mail.com"", ""john00@mail.com""], [""John"", ""jo
hnnybravo@mail.com""], [""John"", ""johnsmith@mail.com"", ""john_newyork@mail.com""]
, [""Mary"", ""mary@mail.com""]]
Output: [[""John"", 'john00@mail.com', 'john_newyork@mail.com', 'johnsmith@mail.com'
], [""John"", ""johnnybravo@mail.com""], [""Mary"", ""mary@mail.com""]]
Explanation:
The first and third John's are the same person as they have the common email ""johns
mith@mail.com"".
The second John and Mary are different people as none of their email addresses are u
sed by other accounts.
We could return these lists in any order, for example the answer [['Mary', 'mary@mai
l.com'], ['John', 'johnnybravo@mail.com'],
['John', 'john00@mail.com', 'john_newyork@mail.com', 'johnsmith@mail.com']] would st
ill be accepted.

Note:
The length of accounts will be in the range [1, 1000].
The length of accounts[i] will be in the range [1, 10].
The length of accounts[i][j] will be in the range [1, 30]."¿
722. Remove Comments https://leetcode.com/problems/remove-comments "Given a C++
program, remove comments from it. The program source is an array where source[i] is
the i-th line of the source code. This represents the result of splitting the orig
inal source code string by the newline character \n.

In C++, there are two types of comments, line comments, and block comments.

The string // denotes a line comment, which represents that it and rest of the chara
cters to the right of it in the same line should be ignored.

The string /* denotes a block comment, which represents that all characters until th
e next (non-overlapping) occurrence of */ should be ignored. (Here, occurrences hap
pen in reading order: line by line from left to right.) To be clear, the string /*/
does not yet end the block comment, as the ending would be overlapping the beginnin
g.

The first effective comment takes precedence over others: if the string // occurs in
a block comment, it is ignored. Similarly, if the string /* occurs in a line or blo
ck comment, it is also ignored.

If a certain line of code is empty after removing comments, you must not output that
line: each string in the answer list will be non-empty.

There will be no control characters, single quote, or double quote characters. For
example, source = ""string s = ""/* Not a comment. */"";"" will not be a test case.
(Also, nothing else such as defines or macros will interfere with the comments.)

It is guaranteed that every open block comment will eventually be closed, so /* outs
ide of a line or block comment always starts a new comment.

Finally, implicit newline characters can be deleted by block comments. Please see t

he examples below for details.

After removing the comments from the source code, return the source code in the same format.

Example 1:

Input:
source = [""/*Test program */"", ""int main()"", ""{ "", "" // variable declaration "", ""int a, b, c;"", ""/* This is a test"", ""   multiline "", ""   comment for ", "", ""   testing */"", ""a = b + c;"", ""}""]

The line by line code is visualized as below:
```
/*Test program */
int main()
{
  // variable declaration
int a, b, c;
/* This is a test
   multiline
   comment for
   testing */
a = b + c;
}
```

Output: [""int main()"",""{ "","" "",""int a, b, c;"",""a = b + c;"","",""}""]

The line by line code is visualized as below:
```
int main()
{

int a, b, c;
a = b + c;
}
```

Explanation:
The string /* denotes a block comment, including line 1 and lines 6-9. The string // denotes line 4 as comments.

Example 2:

Input:
source = [""a/*comment"", ""line"", ""more_comment*/b""]
Output: [""ab""]
Explanation: The original source string is ""a/*comment\nline\nmore_comment*/b"", where we have bolded the newline characters. After deletion, the implicit newline characters are deleted, leaving the string ""ab"", which when delimited by newline characters becomes [""ab""].

Note:
The length of source is in the range [1, 100].
The length of source[i] is in the range [0, 80].
Every open block comment is eventually closed.
There are no single-quote, double-quote, or control characters in the source code."¿ 724. Find Pivot Index https://leetcode.com/problems/find-pivot-index "Given an array of integers nums, write a method that returns the ""pivot"" index of this array.

We define the pivot index as the index where the sum of the numbers to the left of the index is equal to the sum of the numbers to the right of the index.

If no such index exists, we should return -1. If there are multiple pivot indexes, you should return the left-most pivot index.

Example 1:

Input:
nums = [1, 7, 3, 6, 5, 6]

Output: 3
Explanation:
The sum of the numbers to the left of index 3 (nums[3] = 6) is equal to the sum of n
umbers to the right of index 3.
Also, 3 is the first index where this occurs.

Example 2:

Input:
nums = [1, 2, 3]
Output: -1
Explanation:
There is no index that satisfies the conditions in the problem statement.

Note:
The length of nums will be in the range [0, 10000].
Each element nums[i] will be an integer in the range [-1000, 1000]."¿
725. Split Linked List in Parts https://leetcode.com/problems/split-linked-list-in-p
arts "Given a (singly) linked list with head node root, write a function to split
the linked list into k consecutive linked list ""parts"".

The length of each part should be as equal as possible: no two parts should have a s
ize differing by more than 1. This may lead to some parts being null.

The parts should be in order of occurrence in the input list, and parts occurring ea
rlier should always have a size greater than or equal parts occurring later.

Return a List of ListNode's representing the linked list parts that are formed.

Examples
1->2->3->4, k = 5 // 5 equal parts
[[1],
[2],
[3],
[4],
null]

Example 1:

Input:
root = [1, 2, 3], k = 5
Output: [[1],[2],[3],[],[]]
Explanation:
The input and each element of the output are ListNodes, not arrays.
For example, the input root has root.val = 1, root.next.val = 2, \root.next.next.val
= 3, and root.next.next.next = null.
The first element output[0] has output[0].val = 1, output[0].next = null.
The last element output[4] is null, but it's string representation as a ListNode is
[].

Example 2:

Input:
root = [1, 2, 3, 4, 5, 6, 7, 8, 9, 10], k = 3
Output: [[1, 2, 3, 4], [5, 6, 7], [8, 9, 10]]
Explanation:
The input has been split into consecutive parts with size difference at most 1, and
earlier parts are a larger size than the later parts.

Note:
The length of root will be in the range [0, 1000].
Each value of a node in the input will be an integer in the range [0, 999].
k will be an integer in the range [1, 50]."¿
726. Number of Atoms https://leetcode.com/problems/number-of-atoms "Given a che

mical formula (given as a string), return the count of each atom.

An atomic element always starts with an uppercase character, then zero or more lower case letters, representing the name.

1 or more digits representing the count of that element may follow if the count is g reater than 1. If the count is 1, no digits will follow. For example, H2O and H2O2 are possible, but H1O2 is impossible.

Two formulas concatenated together produce another formula. For example, H2O2He3Mg4 is also a formula.

A formula placed in parentheses, and a count (optionally added) is also a formula. For example, (H2O2) and (H2O2)3 are formulas.

Given a formula, output the count of all elements as a string in the following form: the first name (in sorted order), followed by its count (if that count is more than 1), followed by the second name (in sorted order), followed by its count (if that c ount is more than 1), and so on.

Example 1:

Input:
formula = ""H2O""
Output: ""H2O""
Explanation:
The count of elements are {'H': 2, 'O': 1}.

Example 2:

Input:
formula = ""Mg(OH)2""
Output: ""H2MgO2""
Explanation:
The count of elements are {'H': 2, 'Mg': 1, 'O': 2}.

Example 3:

Input:
formula = ""K4(ON(SO3)2)2""
Output: ""K4N2O14S4""
Explanation:
The count of elements are {'K': 4, 'N': 2, 'O': 14, 'S': 4}.

Note:
All atom names consist of lowercase letters, except for the first character which is uppercase.
The length of formula will be in the range [1, 1000].
formula will only consist of letters, digits, and round parentheses, and is a valid formula as defined in the problem."¿
728. Self Dividing Numbers https://leetcode.com/problems/self-dividing-numbers "A s elf-dividing number is a number that is divisible by every digit it contains.

For example, 128 is a self-dividing number because 128 % 1 == 0, 128 % 2 == 0, and 1 28 % 8 == 0.

Also, a self-dividing number is not allowed to contain the digit zero.

Given a lower and upper number bound, output a list of every possible self dividing number, including the bounds if possible.

Example 1:

Input:
left = 1, right = 22
Output: [1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 12, 15, 22]

Note:
The boundaries of each input argument are 1 <= left <= right <= 10000."¿
729. My Calendar I https://leetcode.com/problems/my-calendar-i "Implement a MyCalen
dar class to store your events. A new event can be added if adding the event will no
t cause a double booking.

Your class will have the method, book(int start, int end). Formally, this represent
s a booking on the half open interval [start, end), the range of real numbers x such
 that start <= x < end.

A double booking happens when two events have some non-empty intersection (ie., ther
e is some time that is common to both events.)

For each call to the method MyCalendar.book, return true if the event can be added t
o the calendar successfully without causing a double booking. Otherwise, return fal
se and do not add the event to the calendar.

Your class will be called like this:
MyCalendar cal = new MyCalendar();
MyCalendar.book(start, end)

Example 1:

MyCalendar();
MyCalendar.book(10, 20); // returns true
MyCalendar.book(15, 25); // returns false
MyCalendar.book(20, 30); // returns true
Explanation:
The first event can be booked. The second can't because time 15 is already booked b
y another event.
The third event can be booked, as the first event takes every time less than 20, but
 not including 20.

Note:
The number of calls to MyCalendar.book per test case will be at most 1000.
In calls to MyCalendar.book(start, end), start and end are integers in the range [0,
 10^9]."¿
730. Count Different Palindromic Subsequences https://leetcode.com/problems/count-
different-palindromic-subsequences "Given a string S, find the number of different
non-empty palindromic subsequences in S, and return that number modulo 10^9 + 7.

A subsequence of a string S is obtained by deleting 0 or more characters from S.

A sequence is palindromic if it is equal to the sequence reversed.

Two sequences A_1, A_2, ... and B_1, B_2, ... are different if there is some i for w
hich A_i != B_i.

Example 1:

Input:
S = 'bccb'
Output: 6
Explanation:
The 6 different non-empty palindromic subsequences are 'b', 'c', 'bb', 'cc', 'bcb',
'bccb'.
Note that 'bcb' is counted only once, even though it occurs twice.

Example 2:

Input:
S = 'abcdabcdabcdabcdabcdabcdabcddcbadcbadcbadcbadcbadcbadcbadcba'
Output: 104860361
Explanation:
There are 3104860382 different non-empty palindromic subsequences, which is 10486036

1 modulo 10^9 + 7.

Note:
The length of S will be in the range [1, 1000].
Each character S[i] will be in the set {'a', 'b', 'c', 'd'}."¿
731. My Calendar II https://leetcode.com/problems/my-calendar-ii "Implement a MyCalendarTwo class to store your events. A new event can be added if adding the event will not cause a triple booking.

Your class will have one method, book(int start, int end). Formally, this represents a booking on the half open interval [start, end), the range of real numbers x such that start <= x < end.

A triple booking happens when three events have some non-empty intersection (ie., there is some time that is common to all 3 events.)

For each call to the method MyCalendar.book, return true if the event can be added to the calendar successfully without causing a triple booking. Otherwise, return false and do not add the event to the calendar.

Your class will be called like this:
MyCalendar cal = new MyCalendar();
MyCalendar.book(start, end)

Example 1:

MyCalendar();
MyCalendar.book(10, 20); // returns true
MyCalendar.book(50, 60); // returns true
MyCalendar.book(10, 40); // returns true
MyCalendar.book(5, 15); // returns false
MyCalendar.book(5, 10); // returns true
MyCalendar.book(25, 55); // returns true
Explanation:
The first two events can be booked. The third event can be double booked.
The fourth event (5, 15) can't be booked, because it would result in a triple booking.
The fifth event (5, 10) can be booked, as it does not use time 10 which is already double booked.
The sixth event (25, 55) can be booked, as the time in [25, 40) will be double booked with the third event;
the time [40, 50) will be single booked, and the time [50, 55) will be double booked with the second event.

Note:
The number of calls to MyCalendar.book per test case will be at most 1000.
In calls to MyCalendar.book(start, end), start and end are integers in the range [0, 10^9]."¿
732. My Calendar III https://leetcode.com/problems/my-calendar-iii "Implement a MyCalendarThree class to store your events. A new event can always be added.

Your class will have one method, book(int start, int end). Formally, this represents a booking on the half open interval [start, end), the range of real numbers x such that start <= x < end.

A K-booking happens when K events have some non-empty intersection (ie., there is some time that is common to all K events.)

For each call to the method MyCalendar.book, return an integer K representing the largest integer such that there exists a K-booking in the calendar.

Your class will be called like this:
MyCalendarThree cal = new MyCalendarThree();
MyCalendarThree.book(start, end)

Example 1:

```
MyCalendarThree();
MyCalendarThree.book(10, 20); // returns 1
MyCalendarThree.book(50, 60); // returns 1
MyCalendarThree.book(10, 40); // returns 2
MyCalendarThree.book(5, 15); // returns 3
MyCalendarThree.book(5, 10); // returns 3
MyCalendarThree.book(25, 55); // returns 3
Explanation:
The first two events can be booked and are disjoint, so the maximum K-booking is a 1
-booking.
The third event [10, 40) intersects the first event, and the maximum K-booking is a
2-booking.
The remaining events cause the maximum K-booking to be only a 3-booking.
Note that the last event locally causes a 2-booking, but the answer is still 3 becau
se
eg. [10, 20), [10, 40), and [5, 15) are still triple booked.



Note:
The number of calls to MyCalendarThree.book per test case will be at most 400.
In calls to MyCalendarThree.book(start, end), start and end are integers in the rang
e [0, 10^9]."¿
733. Flood Fill https://leetcode.com/problems/flood-fill    "An image is represented
 by a 2-D array of integers, each integer representing the pixel value of the image
(from 0 to 65535).

Given a coordinate (sr, sc) representing the starting pixel (row and column) of the
flood fill, and a pixel value newColor, ""flood fill"" the image.

To perform a ""flood fill"", consider the starting pixel, plus any pixels connected
4-directionally to the starting pixel of the same color as the starting pixel, plus
any pixels connected 4-directionally to those pixels (also with the same color as th
e starting pixel), and so on.  Replace the color of all of the aforementioned pixels
 with the newColor.

At the end, return the modified image.

Example 1:

Input:
image = [[1,1,1],[1,1,0],[1,0,1]]
sr = 1, sc = 1, newColor = 2
Output: [[2,2,2],[2,2,0],[2,0,1]]
Explanation:
From the center of the image (with position (sr, sc) = (1, 1)), all pixels connected

by a path of the same color as the starting pixel are colored with the new color.
Note the bottom corner is not colored 2, because it is not 4-directionally connected
to the starting pixel.



Note:
The length of image and image[0] will be in the range [1, 50].
The given starting pixel will satisfy 0 <= sr < image.length and 0 <= sc < image[0].
length.
The value of each color in image[i][j] and newColor will be an integer in [0, 65535]
."¿
735. Asteroid Collision https://leetcode.com/problems/asteroid-collision    "We are
given an array asteroids of integers representing asteroids in a row.

For each asteroid, the absolute value represents its size, and the sign represents i
ts direction (positive meaning right, negative meaning left).  Each asteroid moves a
t the same speed.

Find out the state of the asteroids after all collisions.  If two asteroids meet, th
e smaller one will explode.  If both are the same size, both will explode.  Two aste
roids moving in the same direction will never meet.


Example 1:
```

Input:
asteroids = [5, 10, -5]
Output: [5, 10]
Explanation:
The 10 and -5 collide resulting in 10. The 5 and 10 never collide.

Example 2:

Input:
asteroids = [8, -8]
Output: []
Explanation:
The 8 and -8 collide exploding each other.

Example 3:

Input:
asteroids = [10, 2, -5]
Output: [10]
Explanation:
The 2 and -5 collide resulting in -5. The 10 and -5 collide resulting in 10.

Example 4:

Input:
asteroids = [-2, -1, 1, 2]
Output: [-2, -1, 1, 2]
Explanation:
The -2 and -1 are moving left, while the 1 and 2 are moving right.
Asteroids moving the same direction never meet, so no asteroids will meet each other
.

Note:
The length of asteroids will be at most 10000.
Each asteroid will be a non-zero integer in the range [-1000, 1000].."¿
736. Parse Lisp Expression https://leetcode.com/problems/parse-lisp-expression "You
 are given a string expression representing a Lisp-like expression to return the int
eger value of.

The syntax for these expressions is given as follows.

An expression is either an integer, a let-expression, an add-expression, a mult-expr
ession, or an assigned variable. Expressions always evaluate to a single integer.

(An integer could be positive or negative.)

A let-expression takes the form (let v1 e1 v2 e2 ... vn en expr), where let is alway
s the string ""let"", then there are 1 or more pairs of alternating variables and ex
pressions, meaning that the first variable v1 is assigned the value of the expressio
n e1, the second variable v2 is assigned the value of the expression e2, and so on s
equentially; and then the value of this let-expression is the value of the expressio
n expr.

An add-expression takes the form (add e1 e2) where add is always the string ""add"",
 there are always two expressions e1, e2, and this expression evaluates to the addit
ion of the evaluation of e1 and the evaluation of e2.

A mult-expression takes the form (mult e1 e2) where mult is always the string ""mult
"", there are always two expressions e1, e2, and this expression evaluates to the mu
ltiplication of the evaluation of e1 and the evaluation of e2.

For the purposes of this question, we will use a smaller subset of variable names.
A variable starts with a lowercase letter, then zero or more lowercase letters or di
gits. Additionally for your convenience, the names ""add"", ""let"", or ""mult"" ar
e protected and will never be used as variable names.

Finally, there is the concept of scope. When an expression of a variable name is ev
aluated, within the context of that evaluation, the innermost scope (in terms of par
entheses) is checked first for the value of that variable, and then outer scopes are
checked sequentially. It is guaranteed that every expression is legal. Please see
the examples for more details on scope.

Evaluation Examples:

Input: (add 1 2)
Output: 3

Input: (mult 3 (add 2 3))
Output: 15

Input: (let x 2 (mult x 5))
Output: 10

Input: (let x 2 (mult x (let x 3 y 4 (add x y))))
Output: 14
Explanation: In the expression (add x y), when checking for the value of the variabl
e x,
we check from the innermost scope to the outermost in the context of the variable we
are trying to evaluate.
Since x = 3 is found first, the value of x is 3.

Input: (let x 3 x 2 x)
Output: 2
Explanation: Assignment in let statements is processed sequentially.

Input: (let x 1 y 2 x (add x y) (add x y))
Output: 5
Explanation: The first (add x y) evaluates as 3, and is assigned to x.
The second (add x y) evaluates as 3+2 = 5.

Input: (let x 2 (add (let x 3 (let x 4 x)) x))
Output: 6
Explanation: Even though (let x 4 x) has a deeper scope, it is outside the context
of the final x in the add-expression. That final x will equal 2.

Input: (let a1 3 b2 (add a1 1) b2)
Output 4
Explanation: Variable names can contain digits after the first character.

Note:
The given string expression is well formatted: There are no leading or trailing spac
es, there is only a single space separating different components of the string, and
no space between adjacent parentheses. The expression is guaranteed to be legal and
evaluate to an integer.
The length of expression is at most 2000. (It is also non-empty, as that would not
be a legal expression.)
The answer and all intermediate calculations of that answer are guaranteed to fit in
a 32-bit integer."¿
738. Monotone Increasing Digits https://leetcode.com/problems/monotone-increasing-di
gits "Given a non-negative integer N, find the largest number that is less than o
r equal to N with monotone increasing digits.

(Recall that an integer has monotone increasing digits if and only if each pair of a
djacent digits x and y satisfy x <= y.)

Example 1:

Input: N = 10
Output: 9

Example 2:

Input: N = 1234
Output: 1234

Example 3:

Input: N = 332
Output: 299

Note:
N is an integer in the range [0, 10^9]."¿
739. Daily Temperatures https://leetcode.com/problems/daily-temperatures "Given a list of daily temperatures, produce a list that, for each day in the input, tells you how many days you would have to wait until a warmer temperature. If there is no future day for which this is possible, put 0 instead.

For example, given the list temperatures = [73, 74, 75, 71, 69, 72, 76, 73], your output should be [1, 1, 4, 2, 1, 1, 0, 0].

Note:
The length of temperatures will be in the range [1, 30000].
Each temperature will be an integer in the range [30, 100]."¿
740. Delete and Earn https://leetcode.com/problems/delete-and-earn "Given an array nums of integers, you can perform operations on the array.

In each operation, you pick any nums[i] and delete it to earn nums[i] points. After, you must delete every element equal to nums[i] - 1 or nums[i] + 1.

You start with 0 points. Return the maximum number of points you can earn by applying such operations.

Example 1:

Input: nums = [3, 4, 2]
Output: 6
Explanation:
Delete 4 to earn 4 points, consequently 3 is also deleted.
Then, delete 2 to earn 2 points. 6 total points are earned.

Example 2:

Input: nums = [2, 2, 3, 3, 3, 4]
Output: 9
Explanation:
Delete 3 to earn 3 points, deleting both 2's and the 4.
Then, delete 3 again to earn 3 points, and 3 again to earn 3 points.
9 total points are earned.

Note:
The length of nums is at most 20000.
Each element nums[i] is an integer in the range [1, 10000]."¿
741. Cherry Pickup https://leetcode.com/problems/cherry-pickup "In a N x N grid representing a field of cherries, each cell is one of three possible integers.

0 means the cell is empty, so you can pass through;
1 means the cell contains a cherry, that you can pick up and pass through;
-1 means the cell contains a thorn that blocks your way.

Your task is to collect maximum number of cherries possible by following the rules below:

Starting at the position (0, 0) and reaching (N-1, N-1) by moving right or down through valid path cells (cells with value 0 or 1);
After reaching (N-1, N-1), returning to (0, 0) by moving left or up through valid pa

th cells;
When passing through a path cell containing a cherry, you pick it up and the cell be comes an empty cell (0);
If there is no valid path between (0, 0) and (N-1, N-1), then no cherries can be col lected.

Example 1:

Input: grid =
[[0, 1, -1],
 [1, 0, -1],
 [1, 1, 1]]
Output: 5
Explanation:
The player started at (0, 0) and went down, down, right right to reach (2, 2).
4 cherries were picked up during this single trip, and the matrix becomes [[0,1,-1], [0,0,-1],[0,0,0]].
Then, the player went left, up, up, left to return home, picking up one more cherry.
The total number of cherries picked up is 5, and this is the maximum possible.

Note:
grid is an N by N 2D array, with 1 <= N <= 50.
Each grid[i][j] is an integer in the set {-1, 0, 1}.
It is guaranteed that grid[0][0] and grid[N-1][N-1] are not -1."¿
743. Network Delay Time https://leetcode.com/problems/network-delay-time "There a re N network nodes, labelled 1 to N.

Given times, a list of travel times as directed edges times[i] = (u, v, w), where u is the source node, v is the target node, and w is the time it takes for a signal to travel from source to target.

Now, we send a signal from a certain node K. How long will it take for all nodes to receive the signal? If it is impossible, return -1.

Note:

N will be in the range [1, 100].
K will be in the range [1, N].
The length of times will be in the range [1, 6000].
All edges times[i] = (u, v, w) will have 1 <= u, v <= N and 1 <= w <= 100."¿
744. Find Smallest Letter Greater Than Target https://leetcode.com/problems/find-s mallest-letter-greater-than-target "Given a list of sorted characters letters conta ining only lowercase letters, and given a target letter target, find the smallest el ement in the list that is larger than the given target.

Letters also wrap around. For example, if the target is target = 'z' and letters = ['a', 'b'], the answer is 'a'.

Examples:

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

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

Input:
letters = [""c"", ""f"", ""j""]
target = ""d""
Output: ""f""

Input:
letters = [""c"", ""f"", ""j""]

target = ""g""
Output: ""j""

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

Input:
letters = [""c"", ""f"", ""j""]
target = ""k""
Output: ""c""

Note:

letters has a length in range [2, 10000].
letters consists of lowercase letters, and contains at least 2 unique letters.
target is a lowercase letter."¿
745. Prefix and Suffix Search https://leetcode.com/problems/prefix-and-suffix-search "Given many words, words[i] has weight i.

Design a class WordFilter that supports one function, WordFilter.f(String prefix, String suffix).
It will return the word with given prefix and suffix with maximum weight. If no word exists, return -1.

Examples:

Input:
WordFilter([""apple""])
WordFilter.f(""a"", ""e"") // returns 0
WordFilter.f(""b"", """") // returns -1

Note:

words has length in range [1, 15000].
For each test case, up to words.length queries WordFilter.f may be made.
words[i] has length in range [1, 10].
prefix, suffix have lengths in range [0, 10].
words[i] and prefix, suffix queries consist of lowercase letters only."¿
746. Min Cost Climbing Stairs https://leetcode.com/problems/min-cost-climbing-stairs "On a staircase, the i-th step has some non-negative cost cost[i] assigned (0 indexed).

Once you pay the cost, you can either climb one or two steps. You need to find minimum cost to reach the top of the floor, and you can either start from the step with index 0, or the step with index 1.

Example 1:

Input: cost = [10, 15, 20]
Output: 15
Explanation: Cheapest is start on cost[1], pay that cost and go to the top.

Example 2:

Input: cost = [1, 100, 1, 1, 1, 100, 1, 1, 100, 1]
Output: 6
Explanation: Cheapest is start on cost[0], and only step on 1s, skipping cost[3].

Note:

cost will have a length in the range [2, 1000].
Every cost[i] will be an integer in the range [0, 999]."¿
747. Largest Number At Least Twice of Others https://leetcode.com/problems/largest-number-at-least-twice-of-others "In a given integer array nums, there is always exactly one largest element.

Find whether the largest element in the array is at least twice as much as every other number in the array.

If it is, return the index of the largest element, otherwise return -1.

Example 1:

Input: nums = [3, 6, 1, 0]
Output: 1
Explanation: 6 is the largest integer, and for every other number in the array x,
6 is more than twice as big as x. The index of value 6 is 1, so we return 1.

Example 2:

Input: nums = [1, 2, 3, 4]
Output: -1
Explanation: 4 isn't at least as big as twice the value of 3, so we return -1.

Note:

nums will have a length in the range [1, 50].
Every nums[i] will be an integer in the range [0, 99]."¿
748. Shortest Completing Word https://leetcode.com/problems/shortest-completing-word "Find the minimum length word from a given dictionary words, which has all the letters from the string licensePlate. Such a word is said to complete the given string licensePlate

Here, for letters we ignore case. For example, ""P"" on the licensePlate still matches ""p"" on the word.

It is guaranteed an answer exists. If there are multiple answers, return the one that occurs first in the array.

The license plate might have the same letter occurring multiple times. For example, given a licensePlate of ""PP"", the word ""pair"" does not complete the licensePlate, but the word ""supper"" does.

Example 1:

Input: licensePlate = ""1s3 PSt"", words = [""step"", ""steps"", ""stripe"", ""stepple""]
Output: ""steps""
Explanation: The smallest length word that contains the letters ""S"", ""P"", ""S"", and ""T"".
Note that the answer is not ""step"", because the letter ""s"" must occur in the word twice.
Also note that we ignored case for the purposes of comparing whether a letter exists in the word.

Example 2:

Input: licensePlate = ""1s3 456"", words = [""looks"", ""pest"", ""stew"", ""show""]
Output: ""pest""
Explanation: There are 3 smallest length words that contains the letters ""s"".
We return the one that occurred first.

Note:

licensePlate will be a string with length in range [1, 7].
licensePlate will contain digits, spaces, or letters (uppercase or lowercase).
words will have a length in the range [10, 1000].
Every words[i] will consist of lowercase letters, and have length in range [1, 15]."
¿
749. Contain Virus https://leetcode.com/problems/contain-virus "A virus is spreadin
g rapidly, and your task is to quarantine the infected area by installing walls.

The world is modeled as a 2-D array of cells, where 0 represents uninfected cells, a
nd 1 represents cells contaminated with the virus. A wall (and only one wall) can b
e installed between any two 4-directionally adjacent cells, on the shared boundary.

Every night, the virus spreads to all neighboring cells in all four directions unles
s blocked by a wall.
Resources are limited. Each day, you can install walls around only one region -- the
 affected area (continuous block of infected cells) that threatens the most uninfect
ed cells the following night. There will never be a tie.

Can you save the day? If so, what is the number of walls required? If not, and the w
orld becomes fully infected, return the number of walls used.

Example 1:

```
Input: grid =
[[0,1,0,0,0,0,0,1],
 [0,1,0,0,0,0,0,1],
 [0,0,0,0,0,0,0,1],
 [0,0,0,0,0,0,0,0]]
Output: 10
Explanation:
There are 2 contaminated regions.
On the first day, add 5 walls to quarantine the viral region on the left. The board
after the virus spreads is:

[[0,1,0,0,0,0,1,1],
 [0,1,0,0,0,0,1,1],
 [0,0,0,0,0,0,1,1],
 [0,0,0,0,0,0,0,1]]
```

On the second day, add 5 walls to quarantine the viral region on the right. The viru
s is fully contained.

Example 2:

```
Input: grid =
[[1,1,1],
 [1,0,1],
 [1,1,1]]
Output: 4
Explanation: Even though there is only one cell saved, there are 4 walls built.
Notice that walls are only built on the shared boundary of two different cells.
```

Example 3:

```
Input: grid =
[[1,1,1,0,0,0,0,0,0],
 [1,0,1,0,1,1,1,1,1],
 [1,1,1,0,0,0,0,0,0]]
Output: 13
Explanation: The region on the left only builds two new walls.
```

Note:

The number of rows and columns of grid will each be in the range [1, 50].
Each grid[i][j] will be either 0 or 1.
Throughout the described process, there is always a contiguous viral region that wil
l infect strictly more uncontaminated squares in the next round."¿
752. Open the Lock https://leetcode.com/problems/open-the-lock "You have a lock in
front of you with 4 circular wheels. Each wheel has 10 slots: '0', '1', '2', '3', '
4', '5', '6', '7', '8', '9'. The wheels can rotate freely and wrap around: for exam
ple we can turn '9' to be '0', or '0' to be '9'. Each move consists of turning one
wheel one slot.

The lock initially starts at '0000', a string representing the state of the 4 wheels
.

You are given a list of deadends dead ends, meaning if the lock displays any of thes
e codes, the wheels of the lock will stop turning and you will be unable to open it.

Given a target representing the value of the wheels that will unlock the lock, retur
n the minimum total number of turns required to open the lock, or -1 if it is imposs
ible.

Example 1:

Input: deadends = [""0201"",""0101"",""0102"",""1212"",""2002""], target = ""0202""
Output: 6
Explanation:
A sequence of valid moves would be ""0000"" -> ""1000"" -> ""1100"" -> ""1200"" -> "
"1201"" -> ""1202"" -> ""0202"".
Note that a sequence like ""0000"" -> ""0001"" -> ""0002"" -> ""0102"" -> ""0202"" w
ould be invalid,
because the wheels of the lock become stuck after the display becomes the dead end "
"0102"".

Example 2:

Input: deadends = [""8888""], target = ""0009""
Output: 1
Explanation:
We can turn the last wheel in reverse to move from ""0000"" -> ""0009"".

Example 3:

Input: deadends = [""8887"",""8889"",""8878"",""8898"",""8788"",""8988"",""7888"",""
9888""], target = ""8888""
Output: -1
Explanation:
We can't reach the target without getting stuck.

Example 4:

Input: deadends = [""0000""], target = ""8888""
Output: -1

Note:

The length of deadends will be in the range [1, 500].
target will not be in the list deadends.
Every string in deadends and the string target will be a string of 4 digits from the
 10,000 possibilities '0000' to '9999'."¿
753. Cracking the Safe https://leetcode.com/problems/cracking-the-safe "There is a
box protected by a password. The password is n digits, where each letter can be one

of the first k digits 0, 1, ..., k-1.

You can keep inputting the password, the password will automatically be matched agai
nst the last n digits entered.

For example, assuming the password is ""345"", I can open it when I type ""012345"",
but I enter a total of 6 digits.

Please return any string of minimum length that is guaranteed to open the box after
the entire string is inputted.

Example 1:

Input: n = 1, k = 2
Output: ""01""
Note: ""10"" will be accepted too.

Example 2:

Input: n = 2, k = 2
Output: ""00110""
Note: ""01100"", ""10011"", ""11001"" will be accepted too.

Note:

n will be in the range [1, 4].
k will be in the range [1, 10].
k^n will be at most 4096."¿
754. Reach a Number https://leetcode.com/problems/reach-a-number "You are standin
g at position 0 on an infinite number line. There is a goal at position target.

On each move, you can either go left or right. During the n-th move (starting from
1), you take n steps.

Return the minimum number of steps required to reach the destination.

Example 1:

Input: target = 3
Output: 2
Explanation:
On the first move we step from 0 to 1.
On the second step we step from 1 to 3.

Example 2:

Input: target = 2
Output: 3
Explanation:
On the first move we step from 0 to 1.
On the second move we step from 1 to -1.
On the third move we step from -1 to 2.

Note:

target will be a non-zero integer in the range [-10^9, 10^9]."¿
756. Pyramid Transition Matrix https://leetcode.com/problems/pyramid-transition-mat
rix "We are stacking blocks to form a pyramid. Each block has a color which is a on
e letter string, like `'Z'`.

For every block of color `C` we place not in the bottom row, we are placing it on to
p of a left block of color `A` and right block of color `B`. We are allowed to plac

e the block there only if `(A, B, C)` is an allowed triple.

We start with a bottom row of bottom, represented as a single string. We also start with a list of allowed triples allowed. Each allowed triple is represented as a st ring of length 3.

Return true if we can build the pyramid all the way to the top, otherwise false.

Example 1:

Input: bottom = ""XYZ"", allowed = [""XYD"", ""YZE"", ""DEA"", ""FFF""]
Output: true
Explanation:
We can stack the pyramid like this:

```
    A
   / \
  D   E
 / \ / \
X   Y   Z
```

This works because ('X', 'Y', 'D'), ('Y', 'Z', 'E'), and ('D', 'E', 'A') are allowed triples.

Example 2:

Input: bottom = ""XXYX"", allowed = [""XXX"", ""XXY"", ""XYX"", ""XYY"", ""YXZ""]
Output: false
Explanation:
We can't stack the pyramid to the top.
Note that there could be allowed triples (A, B, C) and (A, B, D) with C != D.

Note:

bottom will be a string with length in range [2, 8].
allowed will have length in range [0, 200].
Letters in all strings will be chosen from the set {'A', 'B', 'C', 'D', 'E', 'F', 'G '}."¿
757. Set Intersection Size At Least Two https://leetcode.com/problems/set-intersecti on-size-at-least-two "An integer interval [a, b] (for integers a < b) is a set of all consecutive integers from a to b, including a and b.

Find the minimum size of a set S such that for every integer interval A in intervals , the intersection of S with A has size at least 2.

Example 1:

Input: intervals = [[1, 3], [1, 4], [2, 5], [3, 5]]
Output: 3
Explanation:
Consider the set S = {2, 3, 4}. For each interval, there are at least 2 elements fr om S in the interval.
Also, there isn't a smaller size set that fulfills the above condition.
Thus, we output the size of this set, which is 3.

Example 2:

Input: intervals = [[1, 2], [2, 3], [2, 4], [4, 5]]
Output: 5
Explanation:
An example of a minimum sized set is {1, 2, 3, 4, 5}.

Note:

intervals will have length in range [1, 3000].
intervals[i] will have length 2, representing some integer interval.
intervals[i][j] will be an integer in [0, 10^8]."¿
761. Special Binary String https://leetcode.com/problems/special-binary-string "Spe
cial binary strings are binary strings with the following two properties:

The number of 0's is equal to the number of 1's.
Every prefix of the binary string has at least as many 1's as 0's.

Given a special string S, a move consists of choosing two consecutive, non-empty, sp
ecial substrings of S, and swapping them. (Two strings are consecutive if the last
character of the first string is exactly one index before the first character of the
 second string.)

At the end of any number of moves, what is the lexicographically largest resulting s
tring possible?

Example 1:

Input: S = ""11011000""
Output: ""11100100""
Explanation:
The strings ""10"" [occuring at S[1]] and ""1100"" [at S[3]] are swapped.
This is the lexicographically largest string possible after some number of swaps.

Note:
S has length at most 50.
S is guaranteed to be a special binary string as defined above."¿
762. Prime Number of Set Bits in Binary Representation https://leetcode.com/problem
s/prime-number-of-set-bits-in-binary-representation "Given two integers L and R, fin
d the count of numbers in the range [L, R] (inclusive) having a prime number of set
bits in their binary representation.

(Recall that the number of set bits an integer has is the number of 1s present when
written in binary. For example, 21 written in binary is 10101 which has 3 set bits.
  Also, 1 is not a prime.)

Example 1:
Input: L = 6, R = 10
Output: 4
Explanation:
6 -> 110 (2 set bits, 2 is prime)
7 -> 111 (3 set bits, 3 is prime)
9 -> 1001 (2 set bits , 2 is prime)
10->1010 (2 set bits , 2 is prime)

Example 2:
Input: L = 10, R = 15
Output: 5
Explanation:
10 -> 1010 (2 set bits, 2 is prime)
11 -> 1011 (3 set bits, 3 is prime)
12 -> 1100 (2 set bits, 2 is prime)
13 -> 1101 (3 set bits, 3 is prime)
14 -> 1110 (3 set bits, 3 is prime)
15 -> 1111 (4 set bits, 4 is not prime)

Note:

L, R will be integers L <= R in the range [1, 10^6].
R - L will be at most 10000."¿
763. Partition Labels https://leetcode.com/problems/partition-labels "A string S
of lowercase letters is given. We want to partition this string into as many parts
as possible so that each letter appears in at most one part, and return a list of in
tegers representing the size of these parts.

Example 1:

Input: S = ""ababcbacadefegdehijhklij""
Output: [9,7,8]
Explanation:
The partition is ""ababcbaca"", ""defegde"", ""hijhklij"".
This is a partition so that each letter appears in at most one part.
A partition like ""ababcbacadefegde"", ""hijhklij"" is incorrect, because it splits S into less parts.

Note:

S will have length in range [1, 500].
S will consist of lowercase letters ('a' to 'z') only."¿
764. Largest Plus Sign https://leetcode.com/problems/largest-plus-sign "In a 2D grid from (0, 0) to (N-1, N-1), every cell contains a 1, except those cells in the given list mines which are 0. What is the largest axis-aligned plus sign of 1s contained in the grid? Return the order of the plus sign. If there is none, return 0.

An ""axis-aligned plus sign of 1s of order k"" has some center grid[x][y] = 1 along with 4 arms of length k-1 going up, down, left, and right, and made of 1s. This is demonstrated in the diagrams below. Note that there could be 0s or 1s beyond the arms of the plus sign, only the relevant area of the plus sign is checked for 1s.

Examples of Axis-Aligned Plus Signs of Order k:
Order 1:
000
010
000

Order 2:
00000
00100
01110
00100
00000

Order 3:
0000000
0001000
0001000
0111110
0001000
0001000
0000000

Example 1:
Input: N = 5, mines = [[4, 2]]
Output: 2
Explanation:
11111
11111
11111
11111
11011
In the above grid, the largest plus sign can only be order 2. One of them is marked in bold.

Example 2:
Input: N = 2, mines = []
Output: 1
Explanation:
There is no plus sign of order 2, but there is of order 1.

Example 3:
Input: N = 1, mines = [[0, 0]]

Output: 0
Explanation:
There is no plus sign, so return 0.

Note:

N will be an integer in the range [1, 500].
mines will have length at most 5000.
mines[i] will be length 2 and consist of integers in the range [0, N-1].
(Additionally, programs submitted in C, C++, or C# will be judged with a slightly sm
aller time limit.)"¿
765. Couples Holding Hands https://leetcode.com/problems/couples-holding-hands "N c
ouples sit in 2N seats arranged in a row and want to hold hands. We want to know th
e minimum number of swaps so that every couple is sitting side by side. A swap cons
ists of choosing any two people, then they stand up and switch seats.

The people and seats are represented by an integer from 0 to 2N-1, the couples are n
umbered in order, the first couple being (0, 1), the second couple being (2, 3), and
so on with the last couple being (2N-2, 2N-1).

The couples' initial seating is given by row[i] being the value of the person who is
initially sitting in the i-th seat.

Example 1:
Input: row = [0, 2, 1, 3]
Output: 1
Explanation: We only need to swap the second (row[1]) and third (row[2]) person.

Example 2:
Input: row = [3, 2, 0, 1]
Output: 0
Explanation: All couples are already seated side by side.

Note:

len(row) is even and in the range of [4, 60].
row is guaranteed to be a permutation of 0...len(row)-1."¿
766. Toeplitz Matrix https://leetcode.com/problems/toeplitz-matrix "A matrix is
Toeplitz if every diagonal from top-left to bottom-right has the same element.

Now given an M x N matrix, return True if and only if the matrix is Toeplitz.

Example 1:

Input: matrix = [[1,2,3,4],[5,1,2,3],[9,5,1,2]]
Output: True
Explanation:
1234
5123
9512

In the above grid, the diagonals are ""[9]"", ""[5, 5]"", ""[1, 1, 1]"", ""[2, 2, 2]
"", ""[3, 3]"", ""[4]"", and in each diagonal all elements are the same, so the answ
er is True.

Example 2:

Input: matrix = [[1,2],[2,2]]
Output: False
Explanation:
The diagonal ""[1, 2]"" has different elements.

Note:

matrix will be a 2D array of integers.
matrix will have a number of rows and columns in range [1, 20].
matrix[i][j] will be integers in range [0, 99]."¿
767. Reorganize String https://leetcode.com/problems/reorganize-string "Given a str ing S, check if the letters can be rearranged so that two characters that are adjace nt to each other are not the same.

If possible, output any possible result. If not possible, return the empty string.

Example 1:

Input: S = ""aab""
Output: ""aba""

Example 2:

Input: S = ""aaab""
Output: """"

Note:

S will consist of lowercase letters and have length in range [1, 500]."¿
768. Max Chunks To Make Sorted II https://leetcode.com/problems/max-chunks-to-make -sorted-ii "This question is the same as ""Max Chunks to Make Sorted"" except the i ntegers of the given array are not necessarily distinct, the input array could be up to length 2000, and the elements could be up to 10**8.

Given an array arr of integers (not necessarily distinct), we split the array into s ome number of ""chunks"" (partitions), and individually sort each chunk. After conc atenating them, the result equals the sorted array.

What is the most number of chunks we could have made?

Example 1:

Input: arr = [5,4,3,2,1]
Output: 1
Explanation:
Splitting into two or more chunks will not return the required result.
For example, splitting into [5, 4], [3, 2, 1] will result in [4, 5, 1, 2, 3], which isn't sorted.

Example 2:

Input: arr = [2,1,3,4,4]
Output: 4
Explanation:
We can split into two chunks, such as [2, 1], [3, 4, 4].
However, splitting into [2, 1], [3], [4], [4] is the highest number of chunks possib le.

Note:

arr will have length in range [1, 2000].
arr[i] will be an integer in range [0, 10**8]."¿
769. Max Chunks To Make Sorted https://leetcode.com/problems/max-chunks-to-make-sor ted "Given an array arr that is a permutation of [0, 1, ..., arr.length - 1], we spl it the array into some number of ""chunks"" (partitions), and individually sort each chunk. After concatenating them, the result equals the sorted array.

What is the most number of chunks we could have made?

Example 1:

Input: arr = [4,3,2,1,0]

Output: 1
Explanation:
Splitting into two or more chunks will not return the required result.
For example, splitting into [4, 3], [2, 1, 0] will result in [3, 4, 0, 1, 2], which isn't sorted.

Example 2:

Input: arr = [1,0,2,3,4]
Output: 4
Explanation:
We can split into two chunks, such as [1, 0], [2, 3, 4].
However, splitting into [1, 0], [2], [3], [4] is the highest number of chunks possible.

Note:

    arr will have length in range [1, 10].
    arr[i] will be a permutation of [0, 1, ..., arr.length - 1]."¿
770. Basic Calculator IV   https://leetcode.com/problems/basic-calculator-iv   "Given an expression such as expression = ""e + 8 - a + 5"" and an evaluation map such as {""e"": 1} (given in terms of evalvars = [""e""] and evalints = [1]), return a list of tokens representing the simplified expression, such as [""-1*a"",""14""]

    An expression alternates chunks and symbols, with a space separating each chunk and symbol.
    A chunk is either an expression in parentheses, a variable, or a non-negative integer.
    A variable is a string of lowercase letters (not including digits.) Note that variables can be multiple letters, and note that variables never have a leading coefficient or unary operator like ""2x"" or ""-x"".

Expressions are evaluated in the usual order: brackets first, then multiplication, then addition and subtraction. For example, expression = ""1 + 2 * 3"" has an answer of [""7""].

The format of the output is as follows:

    For each term of free variables with non-zero coefficient, we write the free variables within a term in sorted order lexicographically. For example, we would never write a term like ""b*a*c"", only ""a*b*c"".
    Terms have degree equal to the number of free variables being multiplied, counting multiplicity. (For example, ""a*a*b*c"" has degree 4.) We write the largest degree terms of our answer first, breaking ties by lexicographic order ignoring the leading coefficient of the term.
    The leading coefficient of the term is placed directly to the left with an asterisk separating it from the variables (if they exist.) A leading coefficient of 1 is still printed.
    An example of a well formatted answer is [""-2*a*a*a"", ""3*a*a*b"", ""3*b*b"", ""4*a"", ""5*c"", ""-6""]
    Terms (including constant terms) with coefficient 0 are not included. For example, an expression of ""0"" has an output of [].

Examples:

Input: expression = ""e + 8 - a + 5"", evalvars = [""e""], evalints = [1]
Output: [""-1*a"",""14""]

Input: expression = ""e - 8 + temperature - pressure"",
evalvars = [""e"", ""temperature""], evalints = [1, 12]
Output: [""-1*pressure"",""5""]

Input: expression = ""(e + 8) * (e - 8)"", evalvars = [], evalints = []
Output: [""1*e*e"",""-64""]

Input: expression = ""7 - 7"", evalvars = [], evalints = []

Output: []

Input: expression = ""a * b * c + b * a * c * 4"", evalvars = [], evalints = []
Output: [""5*a*b*c""]

Input: expression = ""((a - b) * (b - c) + (c - a)) * ((a - b) + (b - c) * (c - a))"
",
evalvars = [], evalints = []
Output: [""-1*a*a*b*b"",""2*a*a*b*c"",""-1*a*a*c*c"",""1*a*b*b*b"",""-1*a*b*b*c"",""
-1*a*b*c*c"",""1*a*c*c*c"",""-1*b*b*b*c"",""2*b*b*c*c"",""-1*b*c*c*c"",""2*a*a*b"","
"-2*a*a*c"",""-2*a*b*b"",""2*a*c*c"",""1*b*b*b"",""-1*b*b*c"",""1*b*c*c"",""-1*c*c*c
"",""-1*a*a"",""1*a*b"",""1*a*c"",""-1*b*c""]

Note:

    expression will have length in range [1, 250].
    evalvars, evalints will have equal lengths in range [0, 100]."¿
771. Jewels and Stones https://leetcode.com/problems/jewels-and-stones "You're give
n strings J representing the types of stones that are jewels, and S representing the
 stones you have. Each character in S is a type of stone you have. You want to kno
w how many of the stones you have are also jewels.

The letters in J are guaranteed distinct, and all characters in J and S are letters.
 Letters are case sensitive, so ""a"" is considered a different type of stone from "
"A"".

Example 1:

Input: J = ""aA"", S = ""aAAbbbb""
Output: 3

Example 2:

Input: J = ""z"", S = ""ZZ""
Output: 0

Note:

    S and J will consist of letters and have length at most 50.
    The characters in J are distinct."¿
773. Sliding Puzzle https://leetcode.com/problems/sliding-puzzle   "On a 2x3 board,
 there are 5 tiles represented by the integers 1 through 5, and an empty square repr
esented by 0.

A move consists of choosing 0 and a 4-directionally adjacent number and swapping it.

The state of the board is solved if and only if the board is [[1,2,3],[4,5,0]].

Given a puzzle board, return the least number of moves required so that the state of
 the board is solved. If it is impossible for the state of the board to be solved, r
eturn -1.

Examples:

Input: board = [[1,2,3],[4,0,5]]
Output: 1
Explanation: Swap the 0 and the 5 in one move.

Input: board = [[1,2,3],[5,4,0]]
Output: -1
Explanation: No number of moves will make the board solved.

Input: board = [[4,1,2],[5,0,3]]
Output: 5
Explanation: 5 is the smallest number of moves that solves the board.
An example path:

```
After move 0: [[4,1,2],[5,0,3]]
After move 1: [[4,1,2],[0,5,3]]
After move 2: [[0,1,2],[4,5,3]]
After move 3: [[1,0,2],[4,5,3]]
After move 4: [[1,2,0],[4,5,3]]
After move 5: [[1,2,3],[4,5,0]]


Input: board = [[3,2,4],[1,5,0]]
Output: 14


Note:


    board will be a 2 x 3 array as described above.
    board[i][j] will be a permutation of [0, 1, 2, 3, 4, 5]."¿
775. Global and Local Inversions    https://leetcode.com/problems/global-and-local-i
nversions   "We have some permutation A of [0, 1, ..., N - 1], where N is the length
 of A.

The number of (global) inversions is the number of i < j with 0 <= i < j < N and A[i
] > A[j].

The number of local inversions is the number of i with 0 <= i < N and A[i] > A[i+1].

Return true if and only if the number of global inversions is equal to the number of
 local inversions.

Example 1:

Input: A = [1,0,2]
Output: true
Explanation: There is 1 global inversion, and 1 local inversion.


Example 2:

Input: A = [1,2,0]
Output: false
Explanation: There are 2 global inversions, and 1 local inversion.


Note:


    A will be a permutation of [0, 1, ..., A.length - 1].
    A will have length in range [1, 5000].
    The time limit for this problem has been reduced."¿
777. Swap Adjacent in LR String https://leetcode.com/problems/swap-adjacent-in-lr-st
ring    "In a string composed of 'L', 'R', and 'X' characters, like ""RXXLRXRXL"", a
 move consists of either replacing one occurrence of ""XL"" with ""LX"", or replacin
g one occurrence of ""RX"" with ""XR"". Given the starting string start and the endi
ng string end, return True if and only if there exists a sequence of moves to transf
orm one string to the other.

Example:

Input: start = ""RXXLRXRXL"", end = ""XRLXXRRLX""
Output: True
Explanation:
We can transform start to end following these steps:
RXXLRXRXL ->
XRXLRXRXL ->
XRLXRXRXL ->
XRLXXRRXL ->
XRLXXRRLX


Note:


    1 <= len(start) = len(end) <= 10000.
```

    Both start and end will only consist of characters in {'L', 'R', 'X'}."¿
778. Swim in Rising Water https://leetcode.com/problems/swim-in-rising-water "On an N x N grid, each square grid[i][j] represents the elevation at that point (i,j).

Now rain starts to fall. At time t, the depth of the water everywhere is t. You can swim from a square to another 4-directionally adjacent square if and only if the elevation of both squares individually are at most t. You can swim infinite distance in zero time. Of course, you must stay within the boundaries of the grid during your swim.

You start at the top left square (0, 0). What is the least time until you can reach the bottom right square (N-1, N-1)?

Example 1:

Input: [[0,2],[1,3]]
Output: 3
Explanation:
At time 0, you are in grid location (0, 0).
You cannot go anywhere else because 4-directionally adjacent neighbors have a higher elevation than t = 0.

You cannot reach point (1, 1) until time 3.
When the depth of water is 3, we can swim anywhere inside the grid.

Example 2:

Input: [[0,1,2,3,4],[24,23,22,21,5],[12,13,14,15,16],[11,17,18,19,20],[10,9,8,7,6]]
Output: 16
Explanation:
 0 1 2 3 4
24 23 22 21 5
12 13 14 15 16
11 17 18 19 20
10 9 8 7 6

The final route is marked in bold.
We need to wait until time 16 so that (0, 0) and (4, 4) are connected.

Note:

    2 <= N <= 50.
    grid[i][j] is a permutation of [0, ..., N*N - 1]."¿
779. K-th Symbol in Grammar https://leetcode.com/problems/k-th-symbol-in-grammar "On the first row, we write a 0. Now in every subsequent row, we look at the previous row and replace each occurrence of 0 with 01, and each occurrence of 1 with 10.

Given row N and index K, return the K-th indexed symbol in row N. (The values of K are 1-indexed.) (1 indexed).

Examples:
Input: N = 1, K = 1
Output: 0

Input: N = 2, K = 1
Output: 0

Input: N = 2, K = 2
Output: 1

Input: N = 4, K = 5
Output: 1

Explanation:
row 1: 0
row 2: 01
row 3: 0110
row 4: 01101001

Note:

    N will be an integer in the range [1, 30].
    K will be an integer in the range [1, 2^(N-1)]."¿
780. Reaching Points https://leetcode.com/problems/reaching-points "A move cons
ists of taking a point (x, y) and transforming it to either (x, x+y) or (x+y, y).

Given a starting point (sx, sy) and a target point (tx, ty), return True if and only
 if a sequence of moves exists to transform the point (sx, sy) to (tx, ty). Otherwis
e, return False.

Examples:
Input: sx = 1, sy = 1, tx = 3, ty = 5
Output: True
Explanation:
One series of moves that transforms the starting point to the target is:
(1, 1) -> (1, 2)
(1, 2) -> (3, 2)
(3, 2) -> (3, 5)

Input: sx = 1, sy = 1, tx = 2, ty = 2
Output: False

Input: sx = 1, sy = 1, tx = 1, ty = 1
Output: True

Note:

    sx, sy, tx, ty will all be integers in the range [1, 10^9]."¿
781. Rabbits in Forest https://leetcode.com/problems/rabbits-in-forest "In a forest
, each rabbit has some color. Some subset of rabbits (possibly all of them) tell you
 how many other rabbits have the same color as them. Those answers are placed in an
array.

Return the minimum number of rabbits that could be in the forest.

Examples:
Input: answers = [1, 1, 2]
Output: 5
Explanation:
The two rabbits that answered ""1"" could both be the same color, say red.
The rabbit than answered ""2"" can't be red or the answers would be inconsistent.
Say the rabbit that answered ""2"" was blue.
Then there should be 2 other blue rabbits in the forest that didn't answer into the
array.
The smallest possible number of rabbits in the forest is therefore 5: 3 that answere
d plus 2 that didn't.

Input: answers = [10, 10, 10]
Output: 11

Input: answers = []
Output: 0

Note:

    answers will have length at most 1000.
    Each answers[i] will be an integer in the range [0, 999]."¿
782. Transform to Chessboard https://leetcode.com/problems/transform-to-chessboar
d "An N x N board contains only 0s and 1s. In each move, you can swap any 2 rows w
ith each other, or any 2 columns with each other.

What is the minimum number of moves to transform the board into a ""chessboard"" - a
 board where no 0s and no 1s are 4-directionally adjacent? If the task is impossible
, return -1.

Examples:

```
Input: board = [[0,1,1,0],[0,1,1,0],[1,0,0,1],[1,0,0,1]]
Output: 2
Explanation:
One potential sequence of moves is shown below, from left to right:

0110     1010     1010
0110 --> 1010 --> 0101
1001     0101     1010
1001     0101     0101

The first move swaps the first and second column.
The second move swaps the second and third row.


Input: board = [[0, 1], [1, 0]]
Output: 0
Explanation:
Also note that the board with 0 in the top left corner,
01
10

is also a valid chessboard.

Input: board = [[1, 0], [1, 0]]
Output: -1
Explanation:
No matter what sequence of moves you make, you cannot end with a valid chessboard.


Note:


    board will have the same number of rows and columns, a number in the range [2, 3
0].
    board[i][j] will be only 0s or 1s."¿
783. Minimum Distance Between BST Nodes https://leetcode.com/problems/minimum-distan
ce-between-bst-nodes    "Given a Binary Search Tree (BST) with the root node root, r
eturn the minimum difference between the values of any two different nodes in the tr
ee.

Example :

Input: root = [4,2,6,1,3,null,null]
Output: 1
Explanation:
Note that root is a TreeNode object, not an array.

The given tree [4,2,6,1,3,null,null] is represented by the following diagram:

          4
        /   \
      2      6
     / \
    1   3

while the minimum difference in this tree is 1, it occurs between node 1 and node 2,
 also between node 3 and node 2.


Note:


    The size of the BST will be between 2 and 100.
    The BST is always valid, each node's value is an integer, and each node's value
is different."¿
784. Letter Case Permutation    https://leetcode.com/problems/letter-case-permutatio
n   "Given a string S, we can transform every letter individually to be lowercase or
 uppercase to create another string.  Return a list of all possible strings we could
 create.

Examples:
Input: S = ""a1b2""
Output: [""a1b2"", ""a1B2"", ""A1b2"", ""A1B2""]
```

```
Input: S = ""3z4""
Output: [""3z4"", ""3Z4""]

Input: S = ""12345""
Output: [""12345""]
```

Note:

```
    S will be a string with length at most 12.
    S will consist only of letters or digits."¿
```

785. Is Graph Bipartite? https://leetcode.com/problems/is-graph-bipartite "Given an undirected graph, return true if and only if it is bipartite.

Recall that a graph is bipartite if we can split it's set of nodes into two independent subsets A and B such that every edge in the graph has one node in A and another node in B.

The graph is given in the following form: graph[i] is a list of indexes j for which the edge between nodes i and j exists. Each node is an integer between 0 and graph.length - 1. There are no self edges or parallel edges: graph[i] does not contain i, and it doesn't contain any element twice.

Example 1:
Input: [[1,3], [0,2], [1,3], [0,2]]
Output: true
Explanation:
The graph looks like this:

```
0----1
|    |
|    |
3----2
```

We can divide the vertices into two groups: {0, 2} and {1, 3}.

Example 2:
Input: [[1,2,3], [0,2], [0,1,3], [0,2]]
Output: false
Explanation:
The graph looks like this:

```
0----1
| \  |
|  \ |
3----2
```

We cannot find a way to divide the set of nodes into two independent subsets.

Note:

```
    graph will have length in range [1, 100].
    graph[i] will contain integers in range [0, graph.length - 1].
    graph[i] will not contain i or duplicate values.
    The graph is undirected: if any element j is in graph[i], then i will be in graph[j]."¿
```

786. K-th Smallest Prime Fraction https://leetcode.com/problems/k-th-smallest-prime-fraction "A sorted list A contains 1, plus some number of primes. Then, for every p < q in the list, we consider the fraction p/q.

What is the K-th smallest fraction considered? Return your answer as an array of ints, where answer[0] = p and answer[1] = q.

Examples:
Input: A = [1, 2, 3, 5], K = 3
Output: [2, 5]
Explanation:
The fractions to be considered in sorted order are:
1/5, 1/3, 2/5, 1/2, 3/5, 2/3.
The third fraction is 2/5.

Input: A = [1, 7], K = 1
Output: [1, 7]

Note:

    A will have length between 2 and 2000.
    Each A[i] will be between 1 and 30000.
    K will be between 1 and A.length * (A.length - 1) / 2."¿
787. Cheapest Flights Within K Stops https://leetcode.com/problems/cheapest-flights-within-k-stops "There are n cities connected by m flights. Each fight starts from city u and arrives at v with a price w.

Now given all the cities and fights, together with starting city src and the destination dst, your task is to find the cheapest price from src to dst with up to k stops. If there is no such route, output -1.

Example 1:
Input:
n = 3, edges = [[0,1,100],[1,2,100],[0,2,500]]
src = 0, dst = 2, k = 1
Output: 200
Explanation:
The graph looks like this:

The cheapest price from city 0 to city 2 with at most 1 stop costs 200, as marked red in the picture.

Example 2:
Input:
n = 3, edges = [[0,1,100],[1,2,100],[0,2,500]]
src = 0, dst = 2, k = 0
Output: 500
Explanation:
The graph looks like this:

The cheapest price from city 0 to city 2 with at most 0 stop costs 500, as marked blue in the picture.

Note:

    The number of nodes n will be in range [1, 100], with nodes labeled from 0 to n - 1.
    The size of flights will be in range [0, n * (n - 1) / 2].
    The format of each flight will be (src, dst, price).
    The price of each flight will be in the range [1, 10000].
    k is in the range of [0, n - 1].
    There will not be any duplicated flights or self cycles."¿
788. Rotated Digits https://leetcode.com/problems/rotated-digits "X is a good number if after rotating each digit individually by 180 degrees, we get a valid number that is different from X. Each digit must be rotated - we cannot choose to leave it alone.

A number is valid if each digit remains a digit after rotation. 0, 1, and 8 rotate to themselves; 2 and 5 rotate to each other; 6 and 9 rotate to each other, and the rest of the numbers do not rotate to any other number and become invalid.

Now given a positive number N, how many numbers X from 1 to N are good?

Example:
Input: 10
Output: 4
Explanation:
There are four good numbers in the range [1, 10] : 2, 5, 6, 9.
Note that 1 and 10 are not good numbers, since they remain unchanged after rotating.

Note:

N will be in range [1, 10000]."¿
789. Escape The Ghosts https://leetcode.com/problems/escape-the-ghosts "You are playing a simplified Pacman game. You start at the point (0, 0), and your destination is (target[0], target[1]). There are several ghosts on the map, the i-th ghost starts at (ghosts[i][0], ghosts[i][1]).

Each turn, you and all ghosts simultaneously *may* move in one of 4 cardinal directions: north, east, west, or south, going from the previous point to a new point 1 unit of distance away.

You escape if and only if you can reach the target before any ghost reaches you (for any given moves the ghosts may take.) If you reach any square (including the target) at the same time as a ghost, it doesn't count as an escape.

Return True if and only if it is possible to escape.

Example 1:
Input:
ghosts = [[1, 0], [0, 3]]
target = [0, 1]
Output: true
Explanation:
You can directly reach the destination (0, 1) at time 1, while the ghosts located at (1, 0) or (0, 3) have no way to catch up with you.

Example 2:
Input:
ghosts = [[1, 0]]
target = [2, 0]
Output: false
Explanation:
You need to reach the destination (2, 0), but the ghost at (1, 0) lies between you and the destination.

Example 3:
Input:
ghosts = [[2, 0]]
target = [1, 0]
Output: false
Explanation:
The ghost can reach the target at the same time as you.

Note:

All points have coordinates with absolute value <= 10000.
The number of ghosts will not exceed 100."¿
790. Domino and Tromino Tiling https://leetcode.com/problems/domino-and-tromino-tiling "We have two types of tiles: a 2x1 domino shape, and an ""L"" tromino shape. These shapes may be rotated.

XX <- domino

XX <- ""L"" tromino
X

Given N, how many ways are there to tile a 2 x N board? Return your answer modulo 10^9 + 7.

(In a tiling, every square must be covered by a tile. Two tilings are different if and only if there are two 4-directionally adjacent cells on the board such that exactly one of the tilings has both squares occupied by a tile.)

Example:
Input: 3
Output: 5

Explanation:
The five different ways are listed below, different letters indicates different tile
s:
XYZ XXZ XYY XXY XYY
XYZ YYZ XZZ XYY XXY

Note:

N will be in range [1, 1000]."¿
791. Custom Sort String https://leetcode.com/problems/custom-sort-string "S and T
are strings composed of lowercase letters. In S, no letter occurs more than once.

S was sorted in some custom order previously. We want to permute the characters of T
so that they match the order that S was sorted. More specifically, if x occurs befo
re y in S, then x should occur before y in the returned string.

Return any permutation of T (as a string) that satisfies this property.

Example :
Input:
S = ""cba""
T = ""abcd""
Output: ""cbad""
Explanation:
""a"", ""b"", ""c"" appear in S, so the order of ""a"", ""b"", ""c"" should be ""c""
, ""b"", and ""a"".
Since ""d"" does not appear in S, it can be at any position in T. ""dcba"", ""cdba""
, ""cbda"" are also valid outputs.

Note:

S has length at most 26, and no character is repeated in S.
T has length at most 200.
S and T consist of lowercase letters only."¿
792. Number of Matching Subsequences https://leetcode.com/problems/number-of-matc
hing-subsequences "Given string S and a dictionary of words words, find the number
of words[i] that is a subsequence of S.

Example :
Input:
S = ""abcde""
words = [""a"", ""bb"", ""acd"", ""ace""]
Output: 3
Explanation: There are three words in words that are a subsequence of S: ""a"", ""ac
d"", ""ace"".

Note:

All words in words and S will only consists of lowercase letters.
The length of S will be in the range of [1, 50000].
The length of words will be in the range of [1, 5000].
The length of words[i] will be in the range of [1, 50]."¿
793. Preimage Size of Factorial Zeroes Function https://leetcode.com/problems/preima
ge-size-of-factorial-zeroes-function "Let f(x) be the number of zeroes at the end
of x!. (Recall that x! = 1 * 2 * 3 * ... * x, and by convention, 0! = 1.)

For example, f(3) = 0 because 3! = 6 has no zeroes at the end, while f(11) = 2 becau
se 11! = 39916800 has 2 zeroes at the end. Given K, find how many non-negative integ
ers x have the property that f(x) = K.

Example 1:
Input: K = 0
Output: 5
Explanation: 0!, 1!, 2!, 3!, and 4! end with K = 0 zeroes.

Example 2:

Input: K = 5
Output: 0
Explanation: There is no x such that x! ends in K = 5 zeroes.

Note:

    K will be an integer in the range [0, 10^9]."¿
794. Valid Tic-Tac-Toe State   https://leetcode.com/problems/valid-tic-tac-toe-state   "A Tic-Tac-Toe board is given as a string array board. Return True if and only if it is possible to reach this board position during the course of a valid tic-tac-toe game.

The board is a 3 x 3 array, and consists of characters "" "", ""X"", and ""O"". The "" "" character represents an empty square.

Here are the rules of Tic-Tac-Toe:

    Players take turns placing characters into empty squares ("" "").
    The first player always places ""X"" characters, while the second player always places ""O"" characters.
    ""X"" and ""O"" characters are always placed into empty squares, never filled ones.
    The game ends when there are 3 of the same (non-empty) character filling any row, column, or diagonal.
    The game also ends if all squares are non-empty.
    No more moves can be played if the game is over.

Example 1:
Input: board = [""O "", ""   "", ""   ""]
Output: false
Explanation: The first player always plays ""X"".

Example 2:
Input: board = [""XOX"", "" X "", ""   ""]
Output: false
Explanation: Players take turns making moves.

Example 3:
Input: board = [""XXX"", ""   "", ""OOO""]
Output: false

Example 4:
Input: board = [""XOX"", ""O O"", ""XOX""]
Output: true

Note:

    board is a length-3 array of strings, where each string board[i] has length 3.
    Each board[i][j] is a character in the set {"" "", ""X"", ""O""}."¿
795. Number of Subarrays with Bounded Maximum   https://leetcode.com/problems/number-of-subarrays-with-bounded-maximum   "We are given an array A of positive integers, and two positive integers L and R (L <= R).

Return the number of (contiguous, non-empty) subarrays such that the value of the maximum array element in that subarray is at least L and at most R.

Example :
Input:
A = [2, 1, 4, 3]
L = 2
R = 3
Output: 3
Explanation: There are three subarrays that meet the requirements: [2], [2, 1], [3].

Note:

L, R and A[i] will be an integer in the range [0, 10^9].
The length of A will be in the range of [1, 50000]."¿
796. Rotate String https://leetcode.com/problems/rotate-string "We are given two st
rings, A and B.

A shift on A consists of taking string A and moving the leftmost character to the ri
ghtmost position. For example, if A = 'abcde', then it will be 'bcdea' after one shi
ft on A. Return True if and only if A can become B after some number of shifts on A.

Example 1:
Input: A = 'abcde', B = 'cdeab'
Output: true

Example 2:
Input: A = 'abcde', B = 'abced'
Output: false

Note:

A and B will have length at most 100."¿
797. All Paths From Source to Target https://leetcode.com/problems/all-paths-from
-source-to-target "Given a directed, acyclic graph of N nodes. Find all possible
paths from node 0 to node N-1, and return them in any order.

The graph is given as follows: the nodes are 0, 1, ..., graph.length - 1. graph[i]
 is a list of all nodes j for which the edge (i, j) exists.

Example:
Input: [[1,2], [3], [3], []]
Output: [[0,1,3],[0,2,3]]
Explanation: The graph looks like this:
0--->1
| |
v   v
2--->3
There are two paths: 0 -> 1 -> 3 and 0 -> 2 -> 3.

Note:

The number of nodes in the graph will be in the range [2, 15].
You can print different paths in any order, but you should keep the order of nod
es inside one path."¿
798. Smallest Rotation with Highest Score https://leetcode.com/problems/smallest-r
otation-with-highest-score "Given an array A, we may rotate it by a non-negative in
teger K so that the array becomes A[K], A[K+1], A{K+2], ... A[A.length - 1], A[0], A
[1], ..., A[K-1]. Afterward, any entries that are less than or equal to their index
 are worth 1 point.

For example, if we have [2, 4, 1, 3, 0], and we rotate by K = 2, it becomes [1, 3, 0
, 2, 4]. This is worth 3 points because 1 > 0 [no points], 3 > 1 [no points], 0 <=
2 [one point], 2 <= 3 [one point], 4 <= 4 [one point].

Over all possible rotations, return the rotation index K that corresponds to the hig
hest score we could receive. If there are multiple answers, return the smallest suc
h index K.

Example 1:
Input: [2, 3, 1, 4, 0]
Output: 3
Explanation:
Scores for each K are listed below:
K = 0, A = [2,3,1,4,0],   score 2
K = 1, A = [3,1,4,0,2],   score 3
K = 2, A = [1,4,0,2,3],   score 3
K = 3, A = [4,0,2,3,1],   score 4
K = 4, A = [0,2,3,1,4],   score 3

So we should choose K = 3, which has the highest score.

Example 2:
Input: [1, 3, 0, 2, 4]
Output: 0
Explanation: A will always have 3 points no matter how it shifts.
So we will choose the smallest K, which is 0.

Note:

A will have length at most 20000.
A[i] will be in the range [0, A.length]."¿
799. Champagne Tower https://leetcode.com/problems/champagne-tower "We stack glasses in a pyramid, where the first row has 1 glass, the second row has 2 glasses, and so on until the 100th row. Each glass holds one cup (250ml) of champagne.

Then, some champagne is poured in the first glass at the top. When the top most glass is full, any excess liquid poured will fall equally to the glass immediately to the left and right of it. When those glasses become full, any excess champagne will fall equally to the left and right of those glasses, and so on. (A glass at the bottom row has it's excess champagne fall on the floor.)

For example, after one cup of champagne is poured, the top most glass is full. After two cups of champagne are poured, the two glasses on the second row are half full. After three cups of champagne are poured, those two cups become full - there are 3 full glasses total now. After four cups of champagne are poured, the third row has the middle glass half full, and the two outside glasses are a quarter full, as pictured below.

Now after pouring some non-negative integer cups of champagne, return how full the j-th glass in the i-th row is (both i and j are 0 indexed.)

Example 1:
Input: poured = 1, query_glass = 1, query_row = 1
Output: 0.0
Explanation: We poured 1 cup of champange to the top glass of the tower (which is indexed as (0, 0)). There will be no excess liquid so all the glasses under the top glass will remain empty.

Example 2:
Input: poured = 2, query_glass = 1, query_row = 1
Output: 0.5
Explanation: We poured 2 cups of champange to the top glass of the tower (which is indexed as (0, 0)). There is one cup of excess liquid. The glass indexed as (1, 0) and the glass indexed as (1, 1) will share the excess liquid equally, and each will get half cup of champange.

Note:

poured will be in the range of [0, 10 ^ 9].
query_glass and query_row will be in the range of [0, 99]."¿
801. Minimum Swaps To Make Sequences Increasing https://leetcode.com/problems/minimum-swaps-to-make-sequences-increasing "We have two integer sequences A and B of the same non-zero length.

We are allowed to swap elements A[i] and B[i]. Note that both elements are in the same index position in their respective sequences.

At the end of some number of swaps, A and B are both strictly increasing. (A sequence is strictly increasing if and only if A[0] < A[1] < A[2] < ... < A[A.length - 1].)

Given A and B, return the minimum number of swaps to make both sequences strictly in creasing. It is guaranteed that the given input always makes it possible.

Example:
Input: A = [1,3,5,4], B = [1,2,3,7]
Output: 1
Explanation:
Swap A[3] and B[3]. Then the sequences are:
A = [1, 3, 5, 7] and B = [1, 2, 3, 4]
which are both strictly increasing.

Note:

    A, B are arrays with the same length, and that length will be in the range [1, 1000].
    A[i], B[i] are integer values in the range [0, 2000]."¿
802. Find Eventual Safe States https://leetcode.com/problems/find-eventual-safe-states "In a directed graph, we start at some node and every turn, walk along a directed edge of the graph. If we reach a node that is terminal (that is, it has no outgoing directed edges), we stop.

Now, say our starting node is eventually safe if and only if we must eventually walk to a terminal node. More specifically, there exists a natural number K so that for any choice of where to walk, we must have stopped at a terminal node in less than K steps.

Which nodes are eventually safe? Return them as an array in sorted order.

The directed graph has N nodes with labels 0, 1, ..., N-1, where N is the length of graph. The graph is given in the following form: graph[i] is a list of labels j such that (i, j) is a directed edge of the graph.

Example:
Input: graph = [[1,2],[2,3],[5],[0],[5],[],[]]
Output: [2,4,5,6]
Here is a diagram of the above graph.

Note:

    graph will have length at most 10000.
    The number of edges in the graph will not exceed 32000.
    Each graph[i] will be a sorted list of different integers, chosen within the range [0, graph.length - 1]."¿
803. Bricks Falling When Hit   https://leetcode.com/problems/bricks-falling-when-hit   "We have a grid of 1s and 0s; the 1s in a cell represent bricks. A brick will not drop if and only if it is directly connected to the top of the grid, or at least one of its (4-way) adjacent bricks will not drop.

We will do some erasures sequentially. Each time we want to do the erasure at the location (i, j), the brick (if it exists) on that location will disappear, and then some other bricks may drop because of that erasure.

Return an array representing the number of bricks that will drop after each erasure in sequence.

Example 1:
Input:
grid = [[1,0,0,0],[1,1,1,0]]
hits = [[1,0]]
Output: [2]
Explanation:
If we erase the brick at (1, 0), the brick at (1, 1) and (1, 2) will drop. So we should return 2.

Example 2:

Input:
grid = [[1,0,0,0],[1,1,0,0]]
hits = [[1,1],[1,0]]
Output: [0,0]
Explanation:
When we erase the brick at (1, 0), the brick at (1, 1) has already disappeared due to the last move. So each erasure will cause no bricks dropping. Note that the erased brick (1, 0) will not be counted as a dropped brick.

Note:

The number of rows and columns in the grid will be in the range [1, 200].
The number of erasures will not exceed the area of the grid.
It is guaranteed that each erasure will be different from any other erasure, and located inside the grid.
An erasure may refer to a location with no brick - if it does, no bricks drop."¿
804. Unique Morse Code Words https://leetcode.com/problems/unique-morse-code-words "International Morse Code defines a standard encoding where each letter is mapped to a series of dots and dashes, as follows: ""a"" maps to "".-"", ""b"" maps to ""-..."", ""c"" maps to ""-.-."", and so on.

For convenience, the full table for the 26 letters of the English alphabet is given below:

["".-"",""-..."",""-.-."",""-.."",""."",""..-."",""--."",""...."","".."",""."---"",""-.-"",""-.."",""--"",""-."",""---"",""."--."",""--.-"",""."-."",""..."",""-"",""..-"",""...-"",""."--"",""-..-"",""-.--"",""--.."]

Now, given a list of words, each word can be written as a concatenation of the Morse code of each letter. For example, ""cab"" can be written as ""-.-.-....-"", (which is the concatenation ""-.-."" + ""-..."" + "".-""). We'll call such a concatenation, the transformation of a word.

Return the number of different transformations among all words we have.

Example:
Input: words = [""gin"", ""zen"", ""gig"", ""msg""]
Output: 2
Explanation:
The transformation of each word is:
""gin"" -> ""--...-.""
""zen"" -> ""--...-.""
""gig"" -> ""--...--.""
""msg"" -> ""--...--.""

There are 2 different transformations, ""--...-."" and ""--...--."".

Note:

The length of words will be at most 100.
Each words[i] will have length in range [1, 12].
words[i] will only consist of lowercase letters."¿
805. Split Array With Same Average https://leetcode.com/problems/split-array-with-same-average "In a given integer array A, we must move every element of A to either list B or list C. (B and C initially start empty.)

Return true if and only if after such a move, it is possible that the average value of B is equal to the average value of C, and B and C are both non-empty.

Example :
Input:
[1,2,3,4,5,6,7,8]
Output: true
Explanation: We can split the array into [1,4,5,8] and [2,3,6,7], and both of them have the average of 4.5.

Note:

    The length of A will be in the range [1, 30].
    A[i] will be in the range of [0, 10000]."¿
806. Number of Lines To Write String https://leetcode.com/problems/number-of-lines-to-write-string "We are to write the letters of a given string S, from left to right into lines. Each line has maximum width 100 units, and if writing a letter would cause the width of the line to exceed 100 units, it is written on the next line. We are given an array widths, an array where widths[0] is the width of 'a', widths[1] is the width of 'b', ..., and widths[25] is the width of 'z'.

Now answer two questions: how many lines have at least one character from S, and what is the width used by the last such line? Return your answer as an integer list of length 2.

Example :
Input:
widths = [10,10,10,10,10,10,10,10,10,10,10,10,10,10,10,10,10,10,10,10,10,10,10,10,10,10]
S = ""abcdefghijklmnopqrstuvwxyz""
Output: [3, 60]
Explanation:
All letters have the same length of 10. To write all 26 letters,
we need two full lines and one line with 60 units.

Example :
Input:
widths = [4,10,10,10,10,10,10,10,10,10,10,10,10,10,10,10,10,10,10,10,10,10,10,10,10,10]
S = ""bbbcccdddaaa""
Output: [2, 4]
Explanation:
All letters except 'a' have the same length of 10, and
""bbbcccdddaa"" will cover 9 * 10 + 2 * 4 = 98 units.
For the last 'a', it is written on the second line because
there is only 2 units left in the first line.
So the answer is 2 lines, plus 4 units in the second line.

Note:

    The length of S will be in the range [1, 1000].
    S will only contain lowercase letters.
    widths is an array of length 26.
    widths[i] will be in the range of [2, 10]."¿
807. Max Increase to Keep City Skyline https://leetcode.com/problems/max-increase-to-keep-city-skyline "In a 2 dimensional array grid, each value grid[i][j] represents the height of a building located there. We are allowed to increase the height of any number of buildings, by any amount (the amounts can be different for different buildings). Height 0 is considered to be a building as well.

At the end, the ""skyline"" when viewed from all four directions of the grid, i.e. top, bottom, left, and right, must be the same as the skyline of the original grid. A city's skyline is the outer contour of the rectangles formed by all the buildings when viewed from a distance. See the following example.

What is the maximum total sum that the height of the buildings can be increased?

Example:
Input: grid = [[3,0,8,4],[2,4,5,7],[9,2,6,3],[0,3,1,0]]
Output: 35
Explanation:
The grid is:
[[3, 0, 8, 4],
  [2, 4, 5, 7],

```
  [9, 2, 6, 3],
  [0, 3, 1, 0] ]

The skyline viewed from top or bottom is: [9, 4, 8, 7]
The skyline viewed from left or right is: [8, 7, 9, 3]

The grid after increasing the height of buildings without affecting skylines is:

gridNew = [ [8, 4, 8, 7],
            [7, 4, 7, 7],
            [9, 4, 8, 7],
            [3, 3, 3, 3] ]



Notes:


    1 < grid.length = grid[0].length <= 50.
    All heights grid[i][j] are in the range [0, 100].
    All buildings in grid[i][j] occupy the entire grid cell: that is, they are a 1 x
 1 x grid[i][j] rectangular prism."¿
808. Soup Servings  https://leetcode.com/problems/soup-servings "There are two types
 of soup: type A and type B. Initially we have N ml of each type of soup. There are
four kinds of operations:


    Serve 100 ml of soup A and 0 ml of soup B
    Serve 75 ml of soup A and 25 ml of soup B
    Serve 50 ml of soup A and 50 ml of soup B
    Serve 25 ml of soup A and 75 ml of soup B


When we serve some soup, we give it to someone and we no longer have it.  Each turn,
 we will choose from the four operations with equal probability 0.25. If the remaini
ng volume of soup is not enough to complete the operation, we will serve as much as
we can.  We stop once we no longer have some quantity of both types of soup.

Note that we do not have the operation where all 100 ml's of soup B are used first.


Return the probability that soup A will be empty first, plus half the probability th
at A and B become empty at the same time.



Example:
Input: N = 50
Output: 0.625
Explanation:
If we choose the first two operations, A will become empty first. For the third oper
ation, A and B will become empty at the same time. For the fourth operation, B will
become empty first. So the total probability of A becoming empty first plus half the
 probability that A and B become empty at the same time, is 0.25 * (1 + 1 + 0.5 + 0)
 = 0.625.



Notes:


    0 <= N <= 10^9.
    Answers within 10^-6 of the true value will be accepted as correct."¿
809. Expressive Words   https://leetcode.com/problems/expressive-words  "Sometimes p
eople repeat letters to represent extra feeling, such as ""hello"" -> ""heeellooo"",
 ""hi"" -> ""hiiii"".  Here, we have groups, of adjacent letters that are all the sa
me character, and adjacent characters to the group are different.  A group is extend
ed if that group is length 3 or more, so ""e"" and ""o"" would be extended in the fi
rst example, and ""i"" would be extended in the second example.  As another example,
 the groups of ""abbcccaaaa"" would be ""a"", ""bb"", ""ccc"", and ""aaaa""; and ""c
cc"" and ""aaaa"" are the extended groups of that string.

For some given string S, a query word is stretchy if it can be made to be equal to S
```

by extending some groups. Formally, we are allowed to repeatedly choose a group (a
s defined above) of characters c, and add some number of the same character c to it
so that the length of the group is 3 or more. Note that we cannot extend a group of
 size one like ""h"" to a group of size two like ""hh"" - all extensions must leave
the group extended - ie., at least 3 characters long.

Given a list of query words, return the number of words that are stretchy.

Example:
Input:
S = ""heeellooo""
words = [""hello"", ""hi"", ""helo""]
Output: 1
Explanation:
We can extend ""e"" and ""o"" in the word ""hello"" to get ""heeellooo"".
We can't extend ""helo"" to get ""heeellooo"" because the group ""ll"" is not extend
ed.

Notes:

    0 <= len(S) <= 100.
    0 <= len(words) <= 100.
    0 <= len(words[i]) <= 100.
    S and all words in words consist only of lowercase letters"¿
810. Chalkboard XOR Game   https://leetcode.com/problems/chalkboard-xor-game   "We
are given non-negative integers nums[i] which are written on a chalkboard. Alice an
d Bob take turns erasing exactly one number from the chalkboard, with Alice starting
 first. If erasing a number causes the bitwise XOR of all the elements of the chalk
board to become 0, then that player loses. (Also, we'll say the bitwise XOR of one
element is that element itself, and the bitwise XOR of no elements is 0.)

Also, if any player starts their turn with the bitwise XOR of all the elements of th
e chalkboard equal to 0, then that player wins.

Return True if and only if Alice wins the game, assuming both players play optimally
.

Example:
Input: nums = [1, 1, 2]
Output: false
Explanation:
Alice has two choices: erase 1 or erase 2.
If she erases 1, the nums array becomes [1, 2]. The bitwise XOR of all the elements
of the chalkboard is 1 XOR 2 = 3. Now Bob can remove any element he wants, because A
lice will be the one to erase the last element and she will lose.
If Alice erases 2 first, now nums becomes [1, 1]. The bitwise XOR of all the element
s of the chalkboard is 1 XOR 1 = 0. Alice will lose.

Notes:

    1 <= N <= 1000.
    0 <= nums[i] <= 2^16."¿
811. Subdomain Visit Count https://leetcode.com/problems/subdomain-visit-count "A w
ebsite domain like ""discuss.leetcode.com"" consists of various subdomains. At the t
op level, we have ""com"", at the next level, we have ""leetcode.com"", and at the l
owest level, ""discuss.leetcode.com"". When we visit a domain like ""discuss.leetcod
e.com"", we will also visit the parent domains ""leetcode.com"" and ""com"" implicit
ly.

Now, call a ""count-paired domain"" to be a count (representing the number of visits
 this domain received), followed by a space, followed by the address. An example of
a count-paired domain might be ""9001 discuss.leetcode.com"".

We are given a list cpdomains of count-paired domains. We would like a list of count
-paired domains, (in the same format as the input, and in any order), that explicitl
y counts the number of visits to each subdomain.

Example 1:

Input:
[""9001 discuss.leetcode.com""]
Output:
[""9001 discuss.leetcode.com"", ""9001 leetcode.com"", ""9001 com""]
Explanation:
We only have one website domain: ""discuss.leetcode.com"". As discussed above, the s
ubdomain ""leetcode.com"" and ""com"" will also be visited. So they will all be visi
ted 9001 times.

Example 2:
Input:
[""900 google.mail.com"", ""50 yahoo.com"", ""1 intel.mail.com"", ""5 wiki.org""]
Output:
[""901 mail.com"",""50 yahoo.com"",""900 google.mail.com"",""5 wiki.org"",""5 org"",
""1 intel.mail.com"",""951 com""]
Explanation:
We will visit ""google.mail.com"" 900 times, ""yahoo.com"" 50 times, ""intel.mail.co
m"" once and ""wiki.org"" 5 times. For the subdomains, we will visit ""mail.com"" 90
0 + 1 = 901 times, ""com"" 900 + 50 + 1 = 951 times, and ""org"" 5 times.

Notes:

    The length of cpdomains will not exceed 100.
    The length of each domain name will not exceed 100.
    Each address will have either 1 or 2 ""."" characters.
    The input count in any count-paired domain will not exceed 10000.
    The answer output can be returned in any order."¿
812. Largest Triangle Area https://leetcode.com/problems/largest-triangle-area "You
 have a list of points in the plane. Return the area of the largest triangle that ca
n be formed by any 3 of the points.

Example:
Input: points = [[0,0],[0,1],[1,0],[0,2],[2,0]]
Output: 2
Explanation:
The five points are show in the figure below. The red triangle is the largest.

Notes:

    3 <= points.length <= 50.
    No points will be duplicated.
     -50 <= points[i][j] <= 50.
    Answers within 10^-6 of the true value will be accepted as correct."¿
813. Largest Sum of Averages   https://leetcode.com/problems/largest-sum-of-average
s   "We partition a row of numbers A into at most K adjacent (non-empty) groups, the
n our score is the sum of the average of each group. What is the largest score we ca
n achieve?

Note that our partition must use every number in A, and that scores are not necessar
ily integers.

Example:
Input:
A = [9,1,2,3,9]
K = 3
Output: 20
Explanation:
The best choice is to partition A into [9], [1, 2, 3], [9]. The answer is 9 + (1 + 2
 + 3) / 3 + 9 = 20.
We could have also partitioned A into [9, 1], [2], [3, 9], for example.
That partition would lead to a score of 5 + 2 + 6 = 13, which is worse.

Note:

    1 <= A.length <= 100.
    1 <= A[i] <= 10000.
    1 <= K <= A.length.
    Answers within 10^-6 of the correct answer will be accepted as correct."¿
814. Binary Tree Pruning https://leetcode.com/problems/binary-tree-pruning "We are given the head node root of a binary tree, where additionally every node's value is either a 0 or a 1.

Return the same tree where every subtree (of the given tree) not containing a 1 has been removed.

(Recall that the subtree of a node X is X, plus every node that is a descendant of X.)

Example 1:
Input: [1,null,0,0,1]
Output: [1,null,0,null,1]

Explanation:
Only the red nodes satisfy the property ""every subtree not containing a 1"".
The diagram on the right represents the answer.

Example 2:
Input: [1,0,1,0,0,0,1]
Output: [1,null,1,null,1]

Example 3:
Input: [1,1,0,1,1,0,1,0]
Output: [1,1,0,1,1,null,1]

Note:

    The binary tree will have at most 100 nodes.
    The value of each node will only be 0 or 1."¿
815. Bus Routes https://leetcode.com/problems/bus-routes "We have a list of bus routes. Each routes[i] is a bus route that the i-th bus repeats forever. For example if routes[0] = [1, 5, 7], this means that the first bus (0-th indexed) travels in the sequence 1->5->7->1->5->7->1->... forever.

We start at bus stop S (initially not on a bus), and we want to go to bus stop T. Travelling by buses only, what is the least number of buses we must take to reach our destination? Return -1 if it is not possible.

Example:
Input:
routes = [[1, 2, 7], [3, 6, 7]]
S = 1
T = 6
Output: 2
Explanation:
The best strategy is take the first bus to the bus stop 7, then take the second bus to the bus stop 6.

Note:

    1 <= routes.length <= 500.
    1 <= routes[i].length <= 500.
    0 <= routes[i][j] < 10 ^ 6."¿
816. Ambiguous Coordinates https://leetcode.com/problems/ambiguous-coordinates "We had some 2-dimensional coordinates, like ""(1, 3)"" or ""(2, 0.5)"". Then, we removed all commas, decimal points, and spaces, and ended up with the string S. Return a list of strings representing all possibilities for what our original coordinates could have been.

Our original representation never had extraneous zeroes, so we never started with numbers like ""00"", ""0.0"", ""0.00"", ""1.0"", ""001"", ""00.01"", or any other number that can be represented with less digits. Also, a decimal point within a number never occurs without at least one digit occuring before it, so we never started with numbers like "".1"".

The final answer list can be returned in any order. Also note that all coordinates in the final answer have exactly one space between them (occurring after the comma.)

Example 1:
Input: ""(123)""
Output: [""(1, 23)"", ""(12, 3)"", ""(1.2, 3)"", ""(1, 2.3)""]

Example 2:
Input: ""(00011)""
Output: [""(0.001, 1)"", ""(0, 0.011)""]
Explanation:
0.0, 00, 0001 or 00.01 are not allowed.

Example 3:
Input: ""(0123)""
Output: [""(0, 123)"", ""(0, 12.3)"", ""(0, 1.23)"", ""(0.1, 23)"", ""(0.1, 2.3)"", ""(0.12, 3)""]

Example 4:
Input: ""(100)""
Output: [(10, 0)]
Explanation:
1.0 is not allowed.

Note:

    4 <= S.length <= 12.
    S[0] = ""("", S[S.length - 1] = "")"", and the other elements in S are digits."¿
817. Linked List Components https://leetcode.com/problems/linked-list-components "We are given head, the head node of a linked list containing unique integer values.

We are also given the list G, a subset of the values in the linked list.

Return the number of connected components in G, where two values are connected if they appear consecutively in the linked list.

Example 1:

Input:
head: 0->1->2->3
G = [0, 1, 3]
Output: 2
Explanation:
0 and 1 are connected, so [0, 1] and [3] are the two connected components.

Example 2:

Input:
head: 0->1->2->3->4
G = [0, 3, 1, 4]

Output: 2
Explanation:
0 and 1 are connected, 3 and 4 are connected, so [0, 1] and [3, 4] are the two conne
cted components.

Note:

    If N is the length of the linked list given by head, 1 <= N <= 10000.
    The value of each node in the linked list will be in the range [0, N - 1].
    1 <= G.length <= 10000.
    G is a subset of all values in the linked list."¿
818. Race Car https://leetcode.com/problems/race-car "Your car starts at position
 0 and speed +1 on an infinite number line. (Your car can go into negative position
s.)

Your car drives automatically according to a sequence of instructions A (accelerate)
 and R (reverse).

When you get an instruction ""A"", your car does the following: position += speed, s
peed *= 2.

When you get an instruction ""R"", your car does the following: if your speed is pos
itive then speed = -1 , otherwise speed = 1. (Your position stays the same.)

For example, after commands ""AAR"", your car goes to positions 0->1->3->3, and your
 speed goes to 1->2->4->-1.

Now for some target position, say the length of the shortest sequence of instruction
s to get there.

Example 1:
Input:
target = 3
Output: 2
Explanation:
The shortest instruction sequence is ""AA"".
Your position goes from 0->1->3.

Example 2:
Input:
target = 6
Output: 5
Explanation:
The shortest instruction sequence is ""AAARA"".
Your position goes from 0->1->3->7->7->6.

Note:

    1 <= target <= 10000."¿
819. Most Common Word https://leetcode.com/problems/most-common-word "Given a par
agraph and a list of banned words, return the most frequent word that is not in the
list of banned words. It is guaranteed there is at least one word that isn't banned
, and that the answer is unique.

Words in the list of banned words are given in lowercase, and free of punctuation.
Words in the paragraph are not case sensitive. The answer is in lowercase.

Example:
Input:
paragraph = ""Bob hit a ball, the hit BALL flew far after it was hit.""
banned = [""hit""]
Output: ""ball""
Explanation:
""hit"" occurs 3 times, but it is a banned word.
""ball"" occurs twice (and no other word does), so it is the most frequent non-banne
d word in the paragraph.

Note that words in the paragraph are not case sensitive,
that punctuation is ignored (even if adjacent to words, such as ""ball,""),
and that ""hit"" isn't the answer even though it occurs more because it is banned.

Note:

    1 <= paragraph.length <= 1000.
    1 <= banned.length <= 100.
    1 <= banned[i].length <= 10.
    The answer is unique, and written in lowercase (even if its occurrences in parag
raph may have uppercase symbols, and even if it is a proper noun.)
    paragraph only consists of letters, spaces, or the punctuation symbols !?',;.
    Different words in paragraph are always separated by a space.
    There are no hyphens or hyphenated words.
    Words only consist of letters, never apostrophes or other punctuation symbols."¿
820. Short Encoding of Words   https://leetcode.com/problems/short-encoding-of-word
s   "Given a list of words, we may encode it by writing a reference string S and a l
ist of indexes A.

For example, if the list of words is [""time"", ""me"", ""bell""], we can write it a
s S = ""time#bell#"" and indexes = [0, 2, 5].

Then for each index, we will recover the word by reading from the reference string f
rom that index until we reach a ""#"" character.

What is the length of the shortest reference string S possible that encodes the give
n words?

Example:

Input: words = [""time"", ""me"", ""bell""]
Output: 10
Explanation: S = ""time#bell#"" and indexes = [0, 2, 5].

Note:

    1 <= words.length <= 2000.
    1 <= words[i].length <= 7.
    Each word has only lowercase letters."¿
821. Shortest Distance to a Character   https://leetcode.com/problems/shortest-dista
nce-to-a-character "Given a string S and a character C, return an array of integers
 representing the shortest distance from the character C in the string.

Example 1:

Input: S = ""loveleetcode"", C = 'e'
Output: [3, 2, 1, 0, 1, 0, 0, 1, 2, 2, 1, 0]

Note:

    S string length is in [1, 10000].
    C is a single character, and guaranteed to be in string S.
    All letters in S and C are lowercase."¿
822. Card Flipping Game https://leetcode.com/problems/card-flipping-game   "On a ta
ble are N cards, with a positive integer printed on the front and back of each card
(possibly different).

We flip any number of cards, and after we choose one card.

If the number X on the back of the chosen card is not on the front of any card, then
 this number X is good.

What is the smallest number that is good? If no number is good, output 0.

Here, fronts[i] and backs[i] represent the number on the front and back of card i.

A flip swaps the front and back numbers, so the value on the front is now on the bac
k and vice versa.

Example:

Input: fronts = [1,2,4,4,7], backs = [1,3,4,1,3]
Output: 2
Explanation: If we flip the second card, the fronts are [1,3,4,4,7] and the backs ar
e [1,2,4,1,3].
We choose the second card, which has number 2 on the back, and it isn't on the front
 of any card, so 2 is good.

Note:

    1 <= fronts.length == backs.length <= 1000.
    1 <= fronts[i] <= 2000.
    1 <= backs[i] <= 2000."¿
823. Binary Trees With Factors https://leetcode.com/problems/binary-trees-with-fact
ors "Given an array of unique integers, each integer is strictly greater than 1.

We make a binary tree using these integers and each number may be used for any numbe
r of times.

Each non-leaf node's value should be equal to the product of the values of it's chil
dren.

How many binary trees can we make? Return the answer modulo 10 ** 9 + 7.

Example 1:

Input: A = [2, 4]
Output: 3
Explanation: We can make these trees: [2], [4], [4, 2, 2]

Example 2:

Input: A = [2, 4, 5, 10]
Output: 7
Explanation: We can make these trees: [2], [4], [5], [10], [4, 2, 2], [10, 2, 5], [1
0, 5, 2].

Note:

    1 <= A.length <= 1000.
    2 <= A[i] <= 10 ^ 9."¿
824. Goat Latin https://leetcode.com/problems/goat-latin   "A sentence S is given,
composed of words separated by spaces. Each word consists of lowercase and uppercase
 letters only.

We would like to convert the sentence to ""Goat Latin"" (a made-up language similar
to Pig Latin.)

The rules of Goat Latin are as follows:

    If a word begins with a vowel (a, e, i, o, or u), append ""ma"" to the end of th
e word.

    For example, the word 'apple' becomes 'applema'.

    If a word begins with a consonant (i.e. not a vowel), remove the first letter an
d append it to the end, then add ""ma"".

For example, the word ""goat"" becomes ""oatgma"".

Add one letter 'a' to the end of each word per its word index in the sentence, s
tarting with 1.

For example, the first word gets ""a"" added to the end, the second word gets ""
aa"" added to the end and so on.

Return the final sentence representing the conversion from S to Goat Latin.

Example 1:

Input: ""I speak Goat Latin""
Output: ""Imaa peaksmaaa oatGmaaaa atinLmaaaaa""

Example 2:

Input: ""The quick brown fox jumped over the lazy dog""
Output: ""heTmaa uickqmaaa rownbmaaaa oxfmaaaaa umpedjmaaaaaa overmaaaaaaa hetmaaaaa
aaa azylmaaaaaaaaa ogdmaaaaaaaaaa""

Notes:

S contains only uppercase, lowercase and spaces. Exactly one space between each
word.
1 <= S.length <= 150."¿
825. Friends Of Appropriate Ages https://leetcode.com/problems/friends-of-appropr
iate-ages "Some people will make friend requests. The list of their ages is given
and ages[i] is the age of the ith person.

Person A will NOT friend request person B (B != A) if any of the following condition
s are true:

```
age[B] <= 0.5 * age[A] + 7
age[B] > age[A]
age[B] > 100 && age[A] < 100
```

Otherwise, A will friend request B.

Note that if A requests B, B does not necessarily request A. Also, people will not
friend request themselves.

How many total friend requests are made?

Example 1:

Input: [16,16]
Output: 2
Explanation: 2 people friend request each other.

Example 2:

Input: [16,17,18]
Output: 2
Explanation: Friend requests are made 17 -> 16, 18 -> 17.

Example 3:

Input: [20,30,100,110,120]
Output:
Explanation: Friend requests are made 110 -> 100, 120 -> 110, 120 -> 100.

Notes:

    1 <= ages.length <= 20000.
    1 <= ages[i] <= 120."¿
826. Most Profit Assigning Work https://leetcode.com/problems/most-profit-assigning-work "We have jobs: difficulty[i] is the difficulty of the ith job, and profit[i] is the profit of the ith job.

Now we have some workers. worker[i] is the ability of the ith worker, which means th at this worker can only complete a job with difficulty at most worker[i].

Every worker can be assigned at most one job, but one job can be completed multiple times.

For example, if 3 people attempt the same job that pays $1, then the total profit wi ll be $3. If a worker cannot complete any job, his profit is $0.

What is the most profit we can make?

Example 1:

Input: difficulty = [2,4,6,8,10], profit = [10,20,30,40,50], worker = [4,5,6,7]
Output: 100
Explanation: Workers are assigned jobs of difficulty [4,4,6,6] and they get profit o f [20,20,30,30] seperately.

Notes:

    1 <= difficulty.length = profit.length <= 10000
    1 <= worker.length <= 10000
    difficulty[i], profit[i], worker[i] are in range [1, 10^5]"¿
827. Making A Large Island https://leetcode.com/problems/making-a-large-island "In a 2D grid of 0s and 1s, we change at most one 0 to a 1.

After, what is the size of the largest island? (An island is a 4-directionally conne cted group of 1s).

Example 1:

Input: [[1, 0], [0, 1]]
Output: 3
Explanation: Change one 0 to 1 and connect two 1s, then we get an island with area = 3.

Example 2:

Input: [[1, 1], [1, 0]]
Output: 4
Explanation: Change the 0 to 1 and make the island bigger, only one island with area = 1.

Example 3:

Input: [[1, 1], [1, 1]]
Output: 4
Explanation: Can't change any 0 to 1, only one island with area = 1.

Notes:

    1 <= grid.length = grid[0].length <= 50.
    0 <= grid[i][j] <= 1."