

ASSIGNMENT – 1

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

You can return the answer in any order.

Example 1: Input: nums = [2,7,11,15], target = 9 Output: [0,1]

Explanation: Because nums[0] + nums[1] == 9, we return [0, 1].

PROGRAM:

```
File Edit Format Run Options Window Help
def twoSum(nums, target):
    res = {}
    for i, num in enumerate(nums):
        if target - num in res:
            return [res[target - num], i]
        res[num] = i
    return []
nums = [0,3]
target = 3
print(twoSum(nums, target)) |
```

OUTPUT:

```
-----
312/a.py
[0, 1]
```

2. Add Two Numbers You are given two non-empty linked lists representing two non-negative integers. The digits are stored in reverse order, and each of their nodes contains a single digit.

Add the two numbers and return the sum as a linked list. You may assume the two numbers do not contain any leading zero, except the number 0 itself.

Example 1: Input: l1 = [2,4,3], l2 = [5,6,4] Output: [7,0,8]

Explanation: 342 + 465 = 807

PROGRAM:

```
File Edit Format Run Options Window Help
class ListNode(object):
    def __init__(self, val=0, next=None):
        self.val = val
        self.next = next

def addTwoNumbers(l1, l2):
    dummy = ListNode()
    current, carry = dummy, 0
    while l1 or l2 or carry:
        val1, val2 = (l1.val if l1 else 0), (l2.val if l2 else 0)
        carry, out = divmod(val1 + val2 + carry, 10)
        current.next = ListNode(out)
        current = current.next
        l1, l2 = (l1.next if l1 else None), (l2.next if l2 else None)
    return dummy.next

def create_linked_list(lst):
    dummy = ListNode()
    current = dummy
    for number in lst:
        current.next = ListNode(number)
        current = current.next
    return dummy.next

def linked_list_to_list(node):
    result = []
    while node:
        result.append(node.val)
        node = node.next
    return result

l1 = create_linked_list([2, 4, 3])
l2 = create_linked_list([5, 6, 4])
result = addTwoNumbers(l1, l2)
print(linked_list_to_list(result))
```

OUTPUT:

```
312/a.py
[7, 0, 8]
|
```

3. Longest Substring without Repeating Characters Given a string s, find the length of the longest substring without repeating characters. Example 1:
Input: s = "abcabcbb"

Output: 3

Explanation: The answer is "abc", with the length of 3.

PROGRAM:

```
File Edit Format Run Options Window Help
def longest_substring(s: str) -> int:
    char_index_map = {}
    start = max_length = 0
    for end, char in enumerate(s):
        if char in char_index_map and char_index_map[char] >= start:
            start = char_index_map[char] + 1
        char_index_map[char] = end
        max_length = max(max_length, end - start + 1)
    return max_length
s = "abcabcbb"
print(longest_substring(s))
```

OUTPUT:

```
312/a.py
3
|
```

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

Example 1: Input: nums1 = [1,3], nums2 = [2]

Output: 2.00000

Explanation: merged array = [1,2,3] and median is 2.

PROGRAM:

```
File Edit Format Run Options Window Help
def findMedianSortedArrays(n1, n2):
    nums = sorted(n1 + n2)
    n = len(nums)
    if n % 2 == 1:
        return nums[n // 2]
    else:
        return (nums[n // 2 - 1] + nums[n // 2]) / 2.0
n1 = [1,3,5,9,2]
n2 = [2,6,4,0]
print(findMedianSortedArrays(n1, n2))|
```

OUTPUT:

```
= RESTART: C:/
312/a.py
3
```

5. Longest Palindromic Substring Given a string s, return the longest palindromic substring Example 1: Input: s = "babad"
Output: "bab"
Explanation: "aba" is also a valid answer.

PROGRAM:

```
File Edit Format Run Options Window Help
def longest_palindromic_substring(s):
    def is_palindrome(s):
        return s == s[::-1]
    longest_palindrome = ""
    for i in range(len(s)):
        for j in range(i, len(s)):
            substring = s[i:j+1]
            if is_palindrome(substring) and len(substring) > len(longest_palindrome):
                longest_palindrome = substring
    return longest_palindrome
s = "babad"
print(longest_palindromic_substring(s))
```

OUTPUT:

```
312/a.py
bab
|
```

6. 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"

PROGRAM:

```

File Edit Format Run Options Window Help
def convert(s: str, numRows: int) -> str:
    if numRows == 1 or numRows >= len(s):
        return s
    result = [''] * numRows
    step = 2 * numRows - 2
    for i in range(numRows):
        for j in range(i, len(s), step):
            result[i] += s[j]
            if 0 < i < numRows - 1 and j + step - 2 * i < len(s):
                result[i] += s[j + step - 2 * i]
    return ''.join(result)
s1 = "PAYPALISHIRING"
numRows1 = 3
print(convert(s1, numRows1))

```

OUTPUT:

```

312/a.py
PAHNAPLSIIGYIR

```

7. Reverse Integer Given a signed 32-bit integer x, return x with its digits reversed. If reversing x causes the value to go outside the signed 32-bit integer range $[-2^{31}, 2^{31} - 1]$, then return 0. Assume the environment does not allow you to store 64-bit integers (signed or unsigned). Example 1: Input: x = 123 Output: 321

PROGRAM:

```

File Edit Format Run Options Wir
num=1234
rev=0
while num!=0:
    rem=num%10
    rev=rev*10+rem
    num//=10
print(rev)

```

OUTPUT:

```

312/a.py
4321

```

8. String to Integer (atoi) Implement the `myAtoi(string s)` function, which converts a string to a 32-bit signed integer (similar to C/C++'s `atoi` function).

The algorithm for `myAtoi(string s)` is as follows:

1. Read in and ignore any leading whitespace.
2. Check if the next character (if not already at the end of the string) is '-' or '+'. Read this character in if it is either. This determines if the final result is negative or positive respectively. Assume the result is positive if neither is present.
3. Read in next the characters until the next non-digit character or the end of the input is reached. The rest of the string is ignored.
4. Convert these digits into an integer (i.e. "123" -> 123, "0032" -> 32). If no digits were read, then the integer is 0. Change the sign as necessary (from step 2).
5. If the integer is out of the 32-bit signed integer range $[-2^{31}, 2^{31} - 1]$, then clamp the integer so that it remains in the range. Specifically, integers less than -2^{31} should be clamped to -2^{31} , and integers greater than $2^{31} - 1$ should be clamped to $2^{31} - 1$.
6. Return the integer as the final result.

Note: ● Only the space character ' ' is considered a whitespace character.

● Do not ignore any characters other than the leading whitespace or the rest of the string after the digits.

Example 1: Input: `s = "42"`

Output: 42

PROGRAM:

```

File Edit Format Run Options Window Help
def myAtoi(s: str) -> int:
    s = s.lstrip()
    sign = 1
    if s and s[0] in ['-', '+']:
        if s[0] == '-':
            sign = -1
        s = s[1:]
    num_str = ''
    for c in s:
        if c.isdigit():
            num_str += c
        else:
            break
    num = int(num_str) if num_str else 0
    num *= sign
    num = max(-2*31, min(num, 2*31 - 1))
    return num
print(myAtoi("42"))

```

OUTPUT:

```

= RESTART:
312/a.py
42
|

```

9. Palindrome Number Given an integer x, return true if x is a palindrome, and false otherwise.

Example 1: Input: x = 121

Output: true

Explanation: 121 reads as 121 from left to right and from right to left

PROGRAM:

```
File Edit Format Run Options Window Help
num=127
temp=num
rev=0
while num>0:
    rem=num%10
    rev=rev*10+rem
    num=num//10
if temp==rev:
    print("palindrome")
else:
    print("not palindrome")
```

OUTPUT:

```
312/a.py
not palindrome
```

- 10.Regular Expression Matching Given an input string s and a pattern p, implement regular expression matching with support for '.' and '*' where: ● '.' Matches any single character. ● '*' Matches zero or more of the preceding element. The matching should cover the entire input string (not partial). Example 1: Input: s = "aa", p = "a" Output: false Explanation: "a" does not match the entire string "aa".

PROGRAM:


```
File Edit Format Run Options Window Help
def isMatch(s: str, p: str) -> bool:
    dp = [[False] * (len(p) + 1) for _ in range(len(s) + 1)]

    dp[0][0] = True
    for j in range(1, len(p) + 1):
        if p[j - 1] == '*':
            dp[0][j] = dp[0][j - 2]

    for i in range(1, len(s) + 1):
        for j in range(1, len(p) + 1):
            if p[j - 1] in {s[i - 1], '.'}:
                dp[i][j] = dp[i - 1][j - 1]
            elif p[j - 1] == '*':
                dp[i][j] = dp[i][j - 2] or (dp[i - 1][j] and p[j - 2] in {s[i - 1], '.'})

    return dp[len(s)][len(p)]
print(isMatch("aa", "a"))
```

OUTPUT:

312/a.py

False