

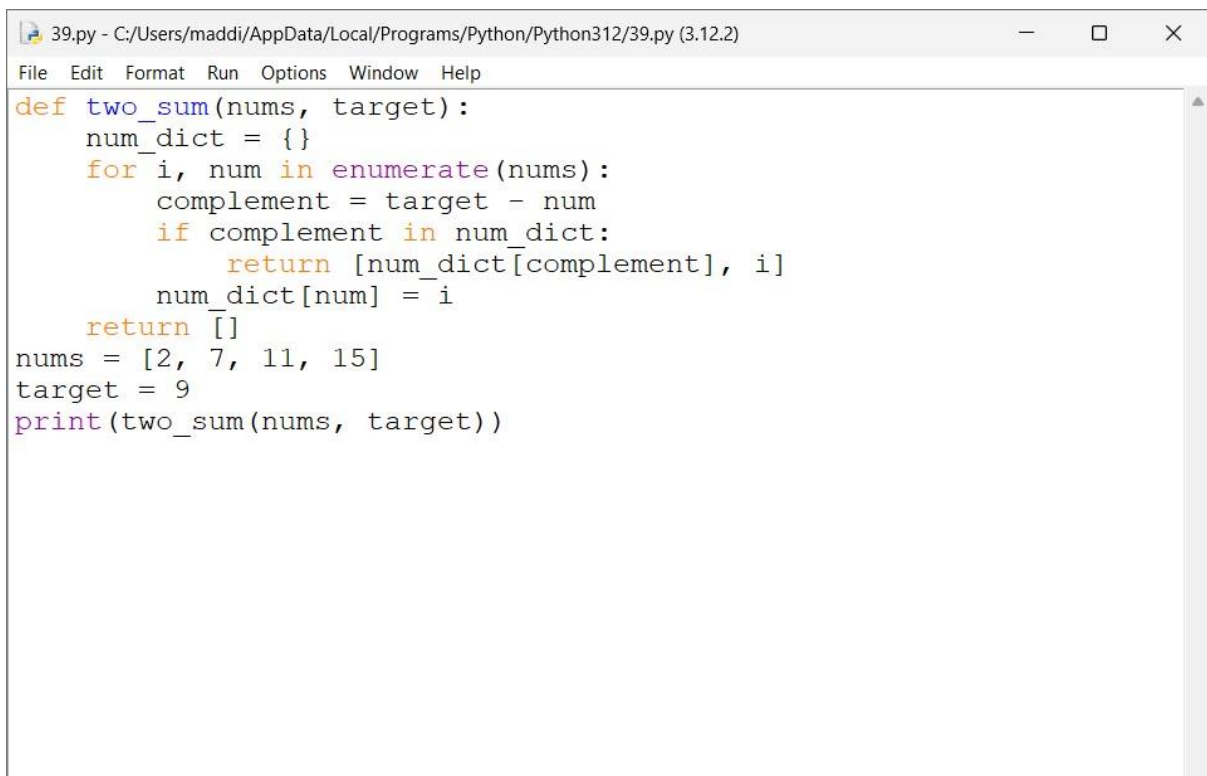
# ASSIGNMENT -1

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1. 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]`. Example 2: Input: `nums = [3,2,4]`, `target = 6` Output: `[1,2]` Example 3: Input: `nums = [3,3]`, `target = 6` Output: `[0,1]`

## PROGRAM:

A screenshot of a Python IDE window titled '39.py - C:/Users/maddi/AppData/Local/Programs/Python/Python312/39.py (3.12.2)'. The window contains a Python script for the two-sum problem. The code defines a function 'two\_sum' that takes a list 'nums' and an integer 'target'. It uses a dictionary 'num\_dict' to store the values of 'nums' as keys and their indices as values. It iterates over 'nums' using 'enumerate', calculates the complement 'target - num', and checks if the complement is in 'num\_dict'. If found, it returns the indices. Otherwise, it adds the current number and index to 'num\_dict'. After the function definition, it sets 'nums = [2, 7, 11, 15]', 'target = 9', and prints the result of 'two\_sum(nums, target)'.

```
def two_sum(nums, target):
    num_dict = {}
    for i, num in enumerate(nums):
        complement = target - num
        if complement in num_dict:
            return [num_dict[complement], i]
        num_dict[num] = i
    return []
nums = [2, 7, 11, 15]
target = 9
print(two_sum(nums, target))
```

## OUTPUT:

```
IDLE Shell 3.12.2
File Edit Shell Debug Options Window Help
Python 3.12.2 (tags/v3.12.2:6abddd9, Feb  6 2024, 21:26:36) [M
SC v.1937 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more in
formation.
>>>
= RESTART: C:/Users/maddi/AppData/Local/Programs/Python/Python
312/39.py
[0, 1]
>>> |
```

2. 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. Example 2: Input: l1 = [0], l2 = [0] Output: [0] Example 3: Input: l1 = [9,9,9,9,9,9,9], l2 = [9,9,9,9] Output: [8,9,9,9,0,0,0,1]

## PROGRAM:

```
39.py - C:/Users/maddi/AppData/Local/Programs/Python/Python312/39.py (3.12.2)
File Edit Format Run Options Window Help
def addTwoNumbers(l1, l2):
    dummy = ListNode(0)
    current = dummy
    carry = 0
    while l1 is not None or l2 is not None:
        x = l1.val if l1 is not None else 0
        y = l2.val if l2 is not None else 0
        total = x + y + carry
        carry = total // 10
        current.next = ListNode(total % 10)
        if l1 is not None:
            l1 = l1.next
        if l2 is not None:
            l2 = l2.next
        current = current.next
    if carry > 0:
        current.next = ListNode(carry)
    return dummy.next
def create_linked_list(lst):
    dummy = ListNode(0)
    current = dummy
    for value in lst:
        current.next = ListNode(value)
        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:

```
*IDLE Shell 3.12.2*
File Edit Shell Debug Options Window Help
Python 3.12.2 (tags/v3.12.2:6abddd9, Feb 6 2024, 21:26:36) [MSC v.1937 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more information.
>>>
= RESTART: C:/Users/maddi/AppData/Local/Programs/Python/Python312/39.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. Example 2: Input: *s* = "bbbb" Output: 1 Explanation: The answer is "b", with the length of 1. Example 3: Input: *s* = "pwwkew" Output: 3 Explanation:

The answer is "wke", with the length of 3. Notice that the answer must be a substring, "pwke" is a subsequence and not a substring.

## PROGRAM:

```
39.py - C:/Users/maddi/AppData/Local/Programs/Python/Python312/39.py (3.12.2)
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:

```
>>> = RESTART: C:/Users/maddi/AppData/Local/Programs/Python/Python
312/39.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. Example 2: Input: nums1 = [1,2], nums2 = [3,4] Output: 2.50000 Explanation: merged array = [1,2,3,4] and median is  $(2 + 3) / 2 = 2.5$ .

## PROGRAM:

```
39.py - C:/Users/maddi/AppData/Local/Programs/Python/Python312/39.py (3.12.2)
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]
n2 = [2]
print(findMedianSortedArrays(n1, n2))
```

## OUTPUT:

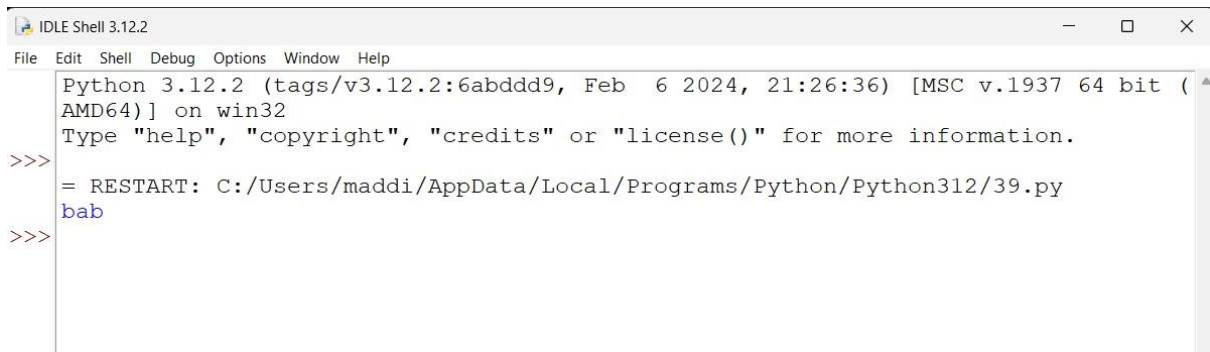
```
*IDLE Shell 3.12.2*
File Edit Shell Debug Options Window Help
Python 3.12.2 (tags/v3.12.2:6abddd9, Feb 6 2024, 21:26:36) [MSC v.1937 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more information.
>>>
= RESTART: C:/Users/maddi/AppData/Local/Programs/Python/Python312/39.py
2
>>>
```

5. Longest Palindromic Substring Given a string s, return the longest palindromic substring in s.  
Example 1: Input: s = "babad" Output: "bab" Explanation: "aba" is also a valid answer. Example 2:  
Input: s = "cbabd" Output: "bb"

## PROGRAM:

```
39.py - C:/Users/maddi/AppData/Local/Programs/Python/Python312/39.py (3.12.2)
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))
```

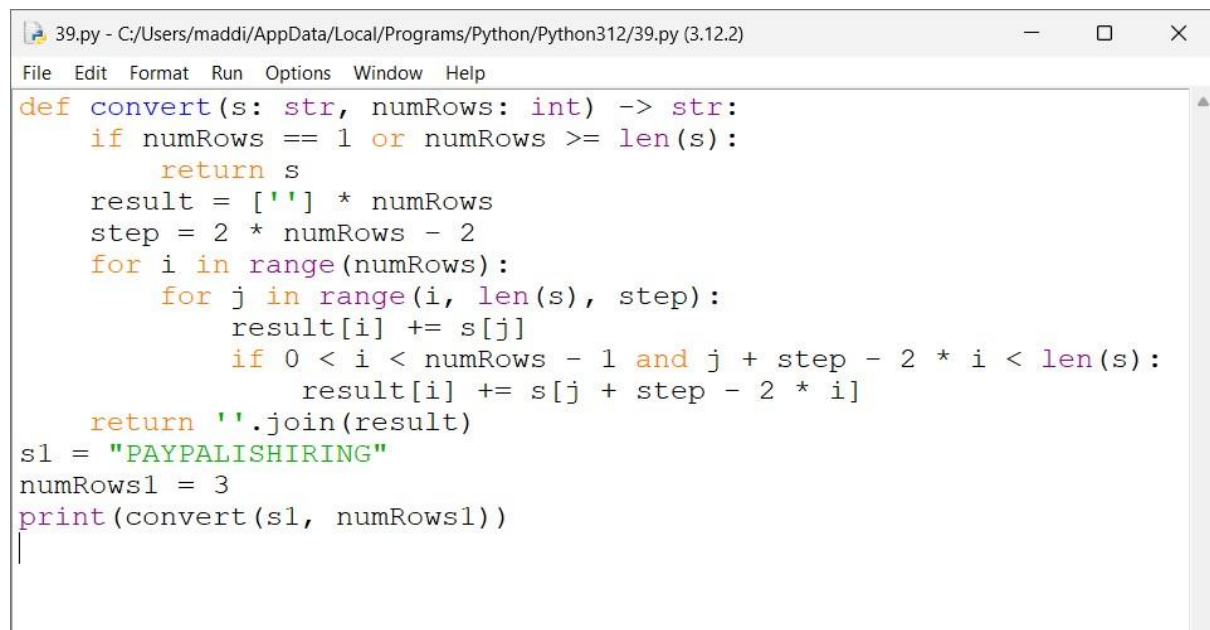
## OUTPUT:



```
IDLE Shell 3.12.2
Python 3.12.2 (tags/v3.12.2:6abddd9, Feb 6 2024, 21:26:36) [MSC v.1937 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more information.
>>>
= RESTART: C:/Users/maddi/AppData/Local/Programs/Python/Python312/39.py
bab
>>>
```

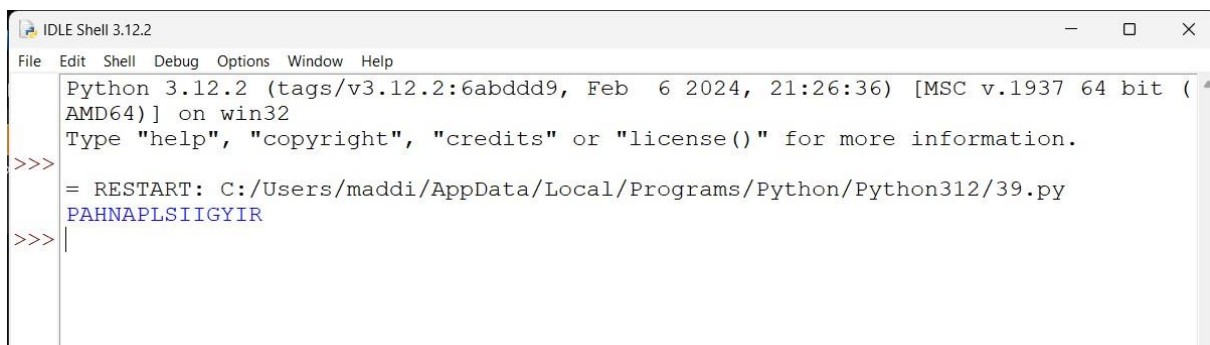
6. Zigzag Conversion The string "PAYPALISHIRING" is written in a zigzag pattern on a given number of rows like this: (you may want to display this pattern in a fixed font for better legibility) P A H N A P L S I I G Y I R And then read line by line: "PAHNAPLSIIGYIR" Write the code that will take a string and make this conversion given a number of rows: string convert(string s, int numRows); Example 1: Input: s = "PAYPALISHIRING", numRows = 3 Output: "PAHNAPLSIIGYIR" Example 2: Input: s = "PAYPALISHIRING", numRows = 4 Output: "PINALSIGYAHRPI" Explanation: P I N A L S I G Y A H R P I Example 3: Input: s = "A", numRows = 1 Output: "A"

## PROGRAM:



```
39.py - C:/Users/maddi/AppData/Local/Programs/Python/Python312/39.py (3.12.2)
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:



```
IDLE Shell 3.12.2
Python 3.12.2 (tags/v3.12.2:6abddd9, Feb 6 2024, 21:26:36) [MSC v.1937 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more information.
>>>
= RESTART: C:/Users/maddi/AppData/Local/Programs/Python/Python312/39.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 Example 2: Input: x = -123 Output: -321 Example 3: Input: x = 120 Output: 21

## PROGRAM:

```
39.py - C:/Users/maddi/AppData/Local/Programs/Python/Python312/39.py (3.12.2)
File Edit Format Run Options Window Help
num=1234
rev=0
while num!=0:
    rem=num%10
    rev=rev*10+rem
    num//=10
print(rev)
```

## OUTPUT:

```
IDLE Shell 3.12.2
File Edit Shell Debug Options Window Help
Python 3.12.2 (tags/v3.12.2:6abddd9, Feb 6 2024, 21:26:36) [MSC v.1937 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more information.
>>>
= RESTART: C:/Users/maddi/AppData/Local/Programs/Python/Python312/39.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 Explanation: The underlined characters are what is read in, the caret is the current reader position. Step 1: "42" (no characters read because there is no leading whitespace) ^ Step 2: "42" (no characters read because there is neither a '-' nor '+') ^ Step 3: "42" ("42" is read in) ^ The parsed integer is 42. Since 42 is in the range [-231, 231 - 1], the final result is 42.

## PROGRAM:

```
39.py - C:/Users/maddi/AppData/Local/Programs/Python/Python312/39.py (3.12.2)
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:

```
IDLE Shell 3.12.2
File Edit Shell Debug Options Window Help
Python 3.12.2 (tags/v3.12.2:6abddd9, Feb 6 2024, 21:26:36) [MSC v.1937 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more information.
>>>
= RESTART: C:/Users/maddi/AppData/Local/Programs/Python/Python312/39.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. Example 2: Input: x = -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: x = 10 Output: false  
Explanation: Reads 01 from right to left. Therefore it is not a palindrome.

## PROGRAM:

```
39.py - C:/Users/maddi/AppData/Local/Programs/Python/Python312/39.py (3.12.2)
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:

```
IDLE Shell 3.12.2
File Edit Shell Debug Options Window Help
Python 3.12.2 (tags/v3.12.2:6abddd9, Feb 6 2024, 21:26:36) [MSC v.1937 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more information.
>>> = RESTART: C:/Users/maddi/AppData/Local/Programs/Python/Python312/39.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:

```
39.py - C:/Users/maddi/AppData/Local/Programs/Python/Python312/39.py (3.12.2)
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] == s[i - 1])

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

## OUTPUT:

```
IDLE Shell 3.12.2
File Edit Shell Debug Options Window Help
Python 3.12.2 (tags/v3.12.2:6abddd9, Feb 6 2024, 21:26:36) [MSC v.1937 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more information.
>>>
= RESTART: C:/Users/maddi/AppData/Local/Programs/Python/Python312/39.py
False
>>>
```