ASSIGNMENT 2:

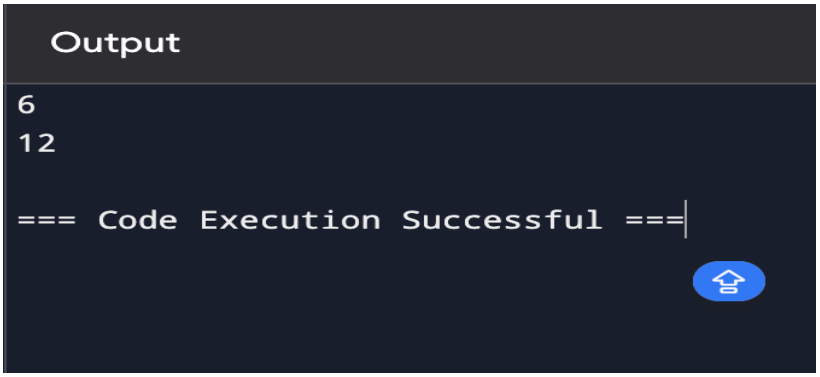
1 . Container With Most Water

You are given an integer array height of length n. There are n vertical lines drawn such that the two endpoints of the ith line are (i, 0) and (i, height[i]). Find two lines that together with the x-axis form a container, such that the container contains the most water. Return the maximum amount of water a container can store. Notice that you may not slant the container

CODE :

```
def maxArea(A, Len) :
        area = 0
        for i in range(Len) :
                for j in range(i + 1, Len) :

                        # Calculating the max area
                        area = max(area, min(A[j], A[i]) * (j - i))
        return area

# Driver code
a = [ 1, 5, 4, 3 ]
b = [ 3, 1, 2, 4, 5 ]

len1 = len(a)
print(maxArea(a, len1))

len2 = len(b)
print(maxArea(b, len2))
```

OUTPUT :



2 . Integer to Roman

CODE :

```
def printRoman(number):
        num = [1, 4, 5, 9, 10, 40, 50, 90,
                100, 400, 500, 900, 1000]
        sym = ["I", "IV", "V", "IX", "X", "XL",
                "L", "XC", "C", "CD", "D", "CM", "M"]
        i = 12
```

ASSIGNMENT 2:

```
        while number:
                div = number // num[i]
                number %= num[i]

                while div:
                        print(sym[i], end = "")
                        div -= 1
                i -= 1

# Driver code
if __name__ == "__main__":
        number = 3549
        print("Roman value is:", end = " ")
        printRoman(number)
```

OUTPUT :

```
Output
Roman value is: MMMDXLIX
=== Code Execution Successful ===
```

3 . Roman to Integer

CODE :

```
def value(r):
        if (r == 'I'):
                return 1
        if (r == 'V'):
                return 5
        if (r == 'X'):
                return 10
        if (r == 'L'):
                return 50
        if (r == 'C'):
                return 100
        if (r == 'D'):
                return 500
        if (r == 'M'):
```

ASSIGNMENT 2:

```
                return 1000
        return -1
def romanToDecimal(str):
        res = 0
        i = 0
        while (i < len(str)):
                s1 = value(str[i])

                if (i + 1 < len(str)):
                        s2 = value(str[i + 1])
                        if (s1 >= s2):
                                res = res + s1
                                i = i + 1
                        else:
                                res = res + s2 - s1
                                i = i + 2
                else:
                        res = res + s1
                        i = i + 1
            return res
# Driver code
print("Integer form of Roman Numeral is"),
print(romanToDecimal("MCMIV"))
```

OUTPUT :

```
Output
Integer form of Roman Numeral is
1904

=== Code Execution Successful ===
```

4 . Longest Common Prefix

CODE :

```
def longestCommonPrefix( a):
        size = len(a)
        if (size == 0):
                return ""

        if (size == 1):
```

ASSIGNMENT 2:

```
            return a[0]
        a.sort()
        end = min(len(a[0]), len(a[size - 1]))
        i = 0
        while (i < end and
            a[0][i] == a[size - 1][i]):
            i += 1

        pre = a[0][0: i]
        return pre

# Driver Code
if __name__ == "__main__":

        input = ["geeksforgeeks", "geeks",
                                "geek", "geezer"]
        print("The longest Common Prefix is :" ,
                            longestCommonPrefix(input))
```

OUTPUT :

```
Output
The longest Common Prefix is : gee

=== Code Execution Successful ===
```

5 . **3Sum**

CODE :

```
class Solution(object):
  def threeSum(self, nums):
    nums.sort()
    result = []
    for i in range(len(nums)-2):
      if i> 0 and nums[i] == nums[i-1]:
        continue
      l = i+1
```

ASSIGNMENT 2:

```
        r = len(nums)-1
        while(l<r):
          sum = nums[i] + nums[l] + nums[r]
          if sum<0:
            l+=1
          elif sum >0:
            r-=1
          else:
            result.append([nums[i],nums[l],nums[r]])
            while l<len(nums)-1 and nums[l] == nums[l + 1] : l += 1
            while r>0 and nums[r] == nums[r - 1]: r -= 1
            l+=1
            r-=1
    return result
ob1 = Solution()
print(ob1.threeSum([-1,0,1,2,-1,-4]))
```

OUTPUT :

```
Output
[[-1, -1, 2], [-1, 0, 1]]

=== Code Execution Successful ===
```

6 . 3Sum Closest

CODE :

```
import sys
def solution(arr, x):
          closestSum = sys.maxsize
          for i in range (len(arr)) :
                    for j in range(i + 1, len(arr)):
                              for k in range(j + 1, len( arr)):
                                        if(abs(x - closestSum) >
```

ASSIGNMENT 2:

```
                                abs(x - (arr[i] +
                                arr[j] + arr[k]))):
                                        closestSum = (arr[i] +arr[j] + arr[k])
        return closestSum


# Driver code
if __name__ == "__main__":
        arr = [ -1, 2, 1, -4 ]
        x = 1
        print(solution(arr, x))
```

OUTPUT :

```
>>> ============ RESTART: /Users/dashm
2
2
>>>
```

7 . Letter Combinations of a Phone Number

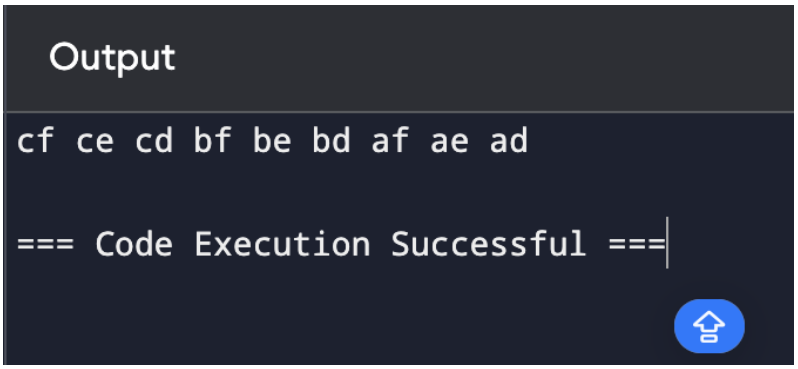
CODE :

```
def letterCombinationsUtil(number, n, table):
        list = []
        q = deque()
        q.append("")

        while len(q) != 0:
                s = q.pop()
                if len(s) == n:
                        list.append(s)
                else:
                        for letter in table[number[len(s)]]:
                                q.append(s + letter)
        return list
```

ASSIGNMENT 2:

```
def letterCombinations(number, n):

        # table[i] stores all characters that
        # corresponds to ith digit in phone
        table = ["0", "1", "abc", "def", "ghi", "jkl",
                        "mno", "pqrs", "tuv", "wxyz"]

        list = letterCombinationsUtil(number, n, table)
        s = ""
        for word in list:
                s += word + " "

        print(s)
        return
# Driver code
number = [2, 3]
n = len(number)
letterCombinations(number, n)
```

OUTPUT :



8 . 4Sum

CODE :

```
class pairSum:
   def __init__(self):
            self.first = ""
```

ASSIGNMENT 2:

```
        self.sec = ""
        self.sum = ""
def noCommon(a, b):
    if (a.first == b.first or a.first == b.sec or a.sec == b.first or a.sec == b.sec):
        return False
return True
def findFourElements(myArr, sum):
 length = len(myArr)
    size = ((length * (length - 1)) // 2)
    aux = [None for _ in range(size)]
    k = 0
    for i in range(length - 1):
        for j in range(i + 1, length):
            aux[k] = pairSum()
            aux[k].sum = myArr[i] + myArr[j]
            aux[k].first = i
            aux[k].sec = j
            k += 1
    aux.sort(key=lambda x: x.sum)
    i = 0
    j = size - 1
    while (i < size and j >= 0):
        if ((aux[i].sum + aux[j].sum == sum)
                and noCommon(aux[i], aux[j])):
            print(myArr[aux[i].first], myArr[aux[i].sec],
                  myArr[aux[j].first], myArr[aux[j].sec], sep=", ")
            return

        elif (aux[i].sum + aux[j].sum < sum):
            i += 1
        else:
            j -= 1
```

ASSIGNMENT 2:

```
# Driver Code
arr = [10, 20, 30, 40, 1, 2]
X = 91
findFourElements(arr, X)
```

OUTPUT :

```
Output
20, 1, 30, 40

=== Code Execution Successful ===
```

9 . Remove Nth Node From End of List

CODE :

```
class Node:
    def __init__(self, value):
        self.data = value
        self.next = None

def length(head):
    temp = head
    count = 0
    while(temp != None):
        count += 1
        temp = temp.next
    return count

def printList(head):
    ptr = head
    while(ptr != None):
        print (ptr.data, end =" ")
        ptr = ptr.next
```

ASSIGNMENT 2:

```
    print()

def deleteNthNodeFromEnd(head, n):
    Length = length(head)
    nodeFromBeginning = Length - n + 1
    prev = None
    temp = head
    for i in range(1, nodeFromBeginning):
        prev = temp
        temp = temp.next
    if(prev == None):
        head = head.next
        return head
    else:
        prev.next = prev.next.next
        return head

if __name__ == '__main__':
    head = Node(1)
    head.next = Node(2)
    head.next.next = Node(3)
    head.next.next.next = Node(4)
    head.next.next.next.next = Node(5)
    print("Linked List before Deletion:")
    printList(head)

    head = deleteNthNodeFromEnd(head, 4)

    print("Linked List after Deletion:")
    printList(head)
```

ASSIGNMENT 2:

OUTPUT :

```
Output
Linked List before Deletion:
1 2 3 4 5
Linked List after Deletion:
1 3 4 5
```

10 . Valid Parentheses

```
open_list = ["[","{","("]
close_list = ["]","}",")"]
def check(myStr):
    stack = []
    for i in myStr:
        if i in open_list:
            stack.append(i)
        elif i in close_list:
            pos = close_list.index(i)
            if ((len(stack) > 0) and
                (open_list[pos] == stack[len(stack)-1])):
                stack.pop()
            else:
                return "Unbalanced"
    if len(stack) == 0:
        return "Balanced"
    else:
        return "Unbalanced"


# Driver code
string = "{[]{()}}"
print(string,"-", check(string))
```

ASSIGNMENT 2:

```
string = "[{}{})(]"
print(string,"-", check(string))
string = "((()"
print(string,"-",check(string))
```

OUTPUT :

```
Output

{[]{()}} - Balanced
[{}{})(] - Unbalanced
(((() - Unbalanced

=== Code Execution Successful ===
```