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Class: MSc CS Part I

Subject: Algorithm

Algorithm Mini Project

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Maximum Subarray Problem

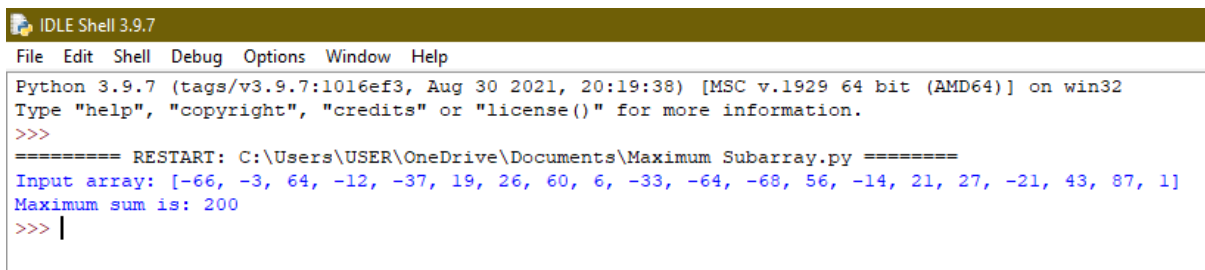
Aim: Write a Python program to implement the maximum subarray problem

Input:

```
def maxSubArray(arr):  
    maxSum = 0  
    curSum = 0  
    for i in range(len(arr)):  
        curSum = curSum + arr[i]  
        if(curSum > maxSum):  
            maxSum = curSum  
        if(curSum<0):  
            curSum = 0  
    return maxSum
```

```
arr=[-66,-3,64,-12,-37,19,26,60,6,-33,-64,-68,56,-14,21,27,-  
21,43,87,1]  
print(f"Input array: {arr}")  
print(f"Maximum sum is: {maxSubArray(arr)}")
```

Output:

A screenshot of the Python IDLE Shell 3.9.7 interface. The title bar is green and says 'IDLE Shell 3.9.7'. Below it is a menu bar with 'File', 'Edit', 'Shell', 'Debug', 'Options', 'Window', and 'Help'. The main text area shows the following output:

```
Python 3.9.7 (tags/v3.9.7:1016ef3, Aug 30 2021, 20:19:38) [MSC v.1929 64 bit (AMD64)] on win32  
Type "help", "copyright", "credits" or "license()" for more information.  
>>>  
===== RESTART: C:\Users\USER\OneDrive\Documents\Maximum Subarray.py =====  
Input array: [-66, -3, 64, -12, -37, 19, 26, 60, 6, -33, -64, -68, 56, -14, 21, 27, -21, 43, 87, 1]  
Maximum sum is: 200  
>>> |
```

Merge Sort

Aim: Write a Python program to implement merge sort.

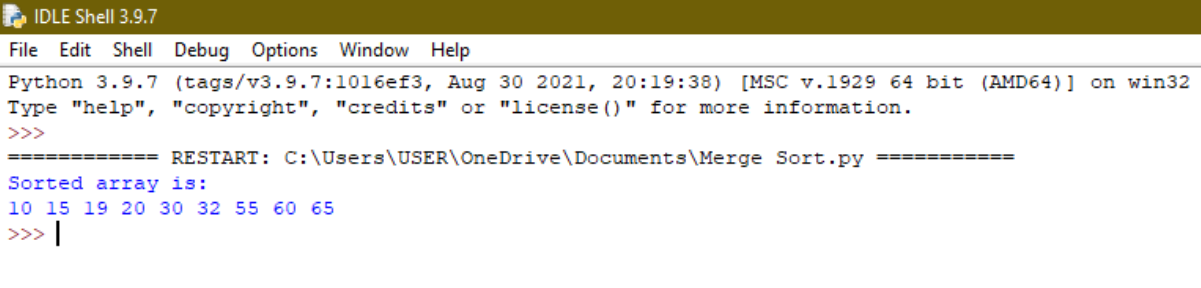
Input:

```
def mergeSort(array):
    if len(array) > 1:
        r = len(array)//2
        L = array[:r]
        M = array[r:]
        mergeSort(L)
        mergeSort(M)
        i = j = k = 0
        while i < len(L) and j < len(M):
            if L[i] < M[j]:
                array[k] = L[i]
                i += 1
            else:
                array[k] = M[j]
                j += 1
            k += 1
        while i < len(L):
            array[k] = L[i]
            i += 1
            k += 1

        while j < len(M):
            array[k] = M[j]
            j += 1
            k += 1
def printList(array):
    for i in range(len(array)):
        print(array[i], end=" ")
    print()
```

```
if __name__ == '__main__':  
    array = [60, 15, 55, 65, 30, 32, 20, 19, 10]  
  
    mergeSort(array)  
  
    print("Sorted array is: ")  
    printList(array)
```

Output:



```
IDLE Shell 3.9.7  
File Edit Shell Debug Options Window Help  
Python 3.9.7 (tags/v3.9.7:1016ef3, Aug 30 2021, 20:19:38) [MSC v.1929 64 bit (AMD64)] on win32  
Type "help", "copyright", "credits" or "license()" for more information.  
>>>  
===== RESTART: C:\Users\USER\OneDrive\Documents\Merge Sort.py =====  
Sorted array is:  
10 15 19 20 30 32 55 60 65  
>>> |
```