## Ex 5 Problems

1. Maximum Sum Subarray problem takes an array of positive and negative integers S as input and finds the subarray of S having maximum sum. For example, consider an array with 16 elements, 13, -3, -25, 20, -3, -16, -23, 18, 20, -7, 12, -5, -22, 15, -4, 7. Maximum subarray starts at index 7 and ends at index 10 (programming indices) and sum is 43.

Write a C++ code to solve the problem using a naive approach. Print the starting index, end index and sum of the subarray whose sum is maximum. What is the time complexity of the algorithm?

2. Develop an algorithm and implement it to solve maximum sum subarray problem using a divide and conquer approach. Print the starting index, end index and sum of the subarray whose sum is maximum. What is the time complexity of the algorithm, compare the performance of the naive algorithm and divide and conquer algorithm for size of inputs 100, 1000, 10000, 50000, 100000, 500000, 1000000

3. Develop an algorithm and implement it to solve maximum sum subarray problem in linear time to print the

starting index, end index and sum of the subarray whose sum is maximum. Compare the performance of this algorithm with naive algorithm and divide and conquer algorithm for size of inputs 100, 1000, 10000, 50000, 100000, 500000, 1000000.

4. Given an array of positive and negative integers, develop a linear algorithm and write a C++ code to check if there exist a subarray whose sum is zero is present in it. If such a subarray exist then print start and end index of first occurrence. Otherwise print -1 for both start and end index. For example, if the array contains seven elements 10, -3, 2, 4, -3, 5, 7 then print start index as 1 and end index as 4.

5. Given an array of positive and negative numbers, develop a linear algorithm and write a C++ code to print the start index, end index and sum of subarray which is having maximum sum and maximum length. Consider an array with 13 elements 4, -12, 3, 10, 4, 5, -15, 6, 7, 1, 3, 1, 4. There are two subarrays having sum as 22, that is starting at 2 and ending at 5 with elements 3, 10, 4, 5 and another subarray that starts at 7 and end at 12 with elements 6, 7, 1, 3, 1, 4