Assignment 03

Task 1: Consider the maximum subsequence sum problem which may defined as: Given an array X[1..n] of natural numbers find values of i and j with 1<= i<=j <=n such that $\sum_{k=i}^{j} X[k]$ is maximized. Design and implement the efficient algorithm for the given problem .
For example: X[]= {5 10 -20 15 -20 8 4 1 2 -1} . Three subsequences of maximum sum of 15 are: X[0:1] , X[3:4] and X[5:9].

Task 2: Assume a given pattern string P[1..m] and a text string T[1..n] where n>=m. We say that pattern P occurs with shift s in text T if 0 <= s <=n-m and T[s+1..s+m]=P[1..m].This classic problem is known as Pattern Matching problem. Hence, if P occurs with shift s in text T , then we call s a valid shift, otherwise we call s an invalid shift. Now implement an algorithm to find all valid shifts with which a given pattern P occurs in a given text T. For example if pattern is "DAA" and text string is "SampleTestProgramTest", then two instances of pattern appears in text at shift s=6 and s= 17.

Task 3: Consider that you have given a problem of counting in a text T, the number of substrings that will start with a X and end with Y. For example text T= HXYX X DYBX in which there are four such substrings. Design an efficient algorithm for the given problem and determine the efficiency of your proposed algorithms.

Task 4: Consider that you are provided a 8 x 8 table of natural numbers. Suppose that in any step you are allowed to either double each of the numbers in any one row, or subtract 1 from each of the numbers in any one column of the table. Write a program which translates the given original table into a table of all zeros. Determine the running time complexity of your devised algorithm?