Lab Assignment 06

Task 1: Consider that you have given a set of items N, each has associated with a weight and a worth profit value. Determine the number of each item to include in a collection so that the total weight is less than or equal to some given weight W and the total profitable value is as large as possible.
Solve this Knapsack Problem where N is number of items and W is the maximum weight of items that can be put in the knapsack using the following approaches:

1. ***Greedy strategy*** *and*

2***. Dynamic strategy***

List the items that are taken inside the knapsack and possible valuable worth of the knapsack.

Create program profile and analyze the running time for different data set. Do the performance evaluation by using gprof. Write your program using modules and multi file programming approach i.e. your program file divided into multiple files and programs into modules.

Task 2: Design and implement an algorithm of finding the **Longest Common Subsequence between given THREE sequences** of strings P of length l, Q of length m and R of length n as $P=<p_1,p_2\ldots p_l>$, $Q=<q_1,q_2\ldots q_m>$, and $R=<r_1,r_2,\ldots r_n>$, where p_i, $1\leq i \leq l$, q_j, $1\leq j \leq m$ and r_j, $1\leq k \leq n$ are members of a finite set of symbols.

Solve the above problem using Dynamic programming approach. Your devised algorithm must be specified as per the four basic steps of dynamic programming i.e. i) Characterize the LCS problem ii) Recursive equation of solution iii) Recursive algorithm based on the recursive solution to determine length of an LCS of three sequences iv) print the LCS of three sequences.

You can make any suitable assumption (if missing) wherever necessary with valid justification.
Perform the analysis of performance as you did for task 1.

Note: You must write your program using modules and multi file programming approach i.e. your program file divided into multiple files and programs into modules.