Homework

Assignment 1 (0-1 Knapsack problem)

Given a set of objects (items) which have both a value and a weight (vi, wi) what is the maximum value we can obtain by selecting a subset of these objects such that the sum of the weights does not exceed a certain capacity (knapsack capacity)

Note: The constraint here is we can either select an item completely or cannot select it at all [It is not possible to select a part of an item into the bag].

Please apply dynamic programming to design an algorithm for this problem. Give your answer for this case:

Knapsack capacity = 7kg

	Object 1	Object 2	Object 3	Object 4	Object 5
Weight	1kg	2kg	3kg	3kg	4kg
Value	2$	3$	2$	4$	5$

Solution: If you can't design an algorithm after studying very hard, just search on google for solution. This problem is very famous.

Assignment 2 (The longest common subsequence problem)

Suppose we have a sequence of letters ACCGGTC. Then a subsequence of this sequence would be like ACCG or ACTC or CCC. To get ACCG, we pick the first four letters. To get ACTC, we pick letters 1, 2, 6, and 7. To get CCC, we pick letters 2, 3, and 7, etc.
Formally, given a sequence $X = x1, x2, \ldots, xm$, another sequence $Z = z1, \ldots, zk$ is a subsequence of X if there exists a **strictly increasing** sequence $i1, i2, \ldots, ik$ of indices of X such that for all $j = 1, 2, \ldots, k$, we have $xij = zj$.
In the **longest-common-subsequence** problem, we are given two sequences X and Y, and want to find the longest possible sequence that is a subsequence of both X and Y. For example, if X = ABCBDAB and Y = BDCABA, the sequence BCA is a common sequence of both X and Y . However, it is not a longest common subsequence, because BCBA is a longer sequence that is also common to both X and Y. Both BCBA and BDAB are longest common subsequences, since there are no common sequences of length 5 or greater.

Please use dynamic algorithm to design an algorithm for this problem

Solution: If you can't design an algorithm after studying very hard, just search on google for solution. This problem is very famous.