Dynamic Programming: AlgoLab 8

You have to use only dynamic programming method to solve following programs.
Hint: http://people.csail.mit.edu/bdean/6.046/dp/)

Lab 8

1. **The Integer Knapsack Problem (Duplicate Items Permitted)**. You have n types of items, where the i^{th} item type has an integer size si and a real value v_i. You have to write a program in C or C++ to fill a knapsack of total capacity C with a selection of items of maximum value. You can add multiple items of the same type to the knapsack.

2. **Integer Knapsack Problem (Duplicate Items Forbidden)**. This is the same problem as the example above, except here it is forbidden to use more than one instance of each type of item.

3. **Making Change**. You are given n types of coin denominations of values $v_1 < v_2 < ... < v_n$ (all integers). Assume $v_1 = 1$, so you can always make change for any amount of money C. You have to write a program in C or C++ which makes change for an amount of money C with as few coins as possible.

4. **Balanced Partition.** You have a set of n integers each in the range $0...K$. You have to write a program in C or C++ to partition these integers into two subsets such that you minimize $|S_1 - S_2|$, where S_1 and S_2 denote the sums of the elements in each of the two subsets.

5. Write a program to find an optimal parenthesization of a matrix-chain product. Run your program whose sequence of dimensions is $< 5, 10, 3, 12, 5, 50, 6 >$.