
O COMP 215 Algorithms Θ

Lab #11

This work should be submitted electronically before 11:59pm Friday. There is comparatively little you need to code this time, so please submit a single file `lab11.cpp` containing all your code.

In this lab, you will implement the `ChangeMaking` algorithm from the textbook, but instead of only computing the number of coins necessary for each amount, you will also determine how many of each coin are necessary.

We assume that we live in a country ruled by a mad president who decided to have a coin worth 1¢, a coin worth 7¢, a coin worth 30¢, a coin worth 84¢ and a coin worth 235¢.

Write a function `ChangeMaking` that takes a number `n` as input (the amount of change desired) and uses the dynamic programming algorithm from the book to find the minimum number of coins to get that amount of change, but instead of using a simple array of numbers `F` as the book did, create your own data structure `changeStruct` that contains data members that will allow you to keep track of the number of each coin necessary to get each amount of change. So the array `F` will be an array of `changeStructs` and when your function is finished, it should print on screen the number of each coin to get the amount of change given as input.

The main function should be a simple loop that repeatedly prompts the user for amounts of change and calls the function `ChangeMaking` on that number, until the user enters a negative number.

If you are feeling ambitious (or really bored), write a function `ChangeMakingGreedy` that also attempts to give change, but this time using the greedy algorithm, and modify your main function to ask the user which algorithm he wishes to use after entering the amount.

You do not have to do this second function for the lab, but you will be given bonus points if you get this algorithm done correctly.