

Lab Exercise 6

Problem 1: Coin-Changing Problem.

a) You have an unlimited collections of the following coins: 1, 5, 10 and 25 paise. Design and implement a greedy algorithm that returns change for some 'n' paise, such that the **number of coins** returned in the change is minimal. For e.g. to optimally change 32 paise, we would need four coins i.e. {25, 5, 1, 1}. Argue that your Greedy algorithm works correctly for any value of n.

b) Will your algorithm work on any possible set of changing coins ? For e.g. if you only had {1,10,25} paise coins, or any other such set, would your algorithm still work correctly ?

Problem 2: Job Scheduling with Deadlines.

This is a variation of the scheduling problem discussed in class. We have a set of n jobs that need to be processed one by one on a given machine. Each job takes exactly 1 unit of time to complete. Each job also has a deadline and profit associated with it: the i^{th} job's deadline is d_i and profit is p_i . The profit p_i is awarded only if job i finishes execution on or before the deadline d_i .

a) Design a greedy algorithm that schedules the n jobs such that the profit is maximized.

b) What is the time complexity of your algorithm ?