Homework Assignment #7
Due: March 12, 11:30 a.m.

1.

(a) Suppose you have an unlimited supply of pennies, nickels and dimes. Given $n \in \mathbb{N}$, you want to find a set of coins that add up to $n\,¢$. The goal is to find a set of minimal size (i.e., your solution should use the smallest possible number of coins).

In class, we saw a greedy algorithm that did this by adding the largest coin that is smaller than the remaining total. To construct the solution, that algorithm first added dimes, then nickels, and then pennies to the set.

Design a *different* greedy algorithm that first adds pennies, then nickels, and then dimes to the set. At each step, the decision about what coin to add next should be made as simply as possible.

(b) Prove that your algorithm always finds an optimal solution.

(c) Give a set of coin denominations where the approach you use in part (a) would not always find an optimal solution.