1. Greedy algorithm

Consider the problem of making change for n cents using the fewest number of coins. Assume that each coin's value is an integer.

a. Give a set of coin denominations for which the greedy algorithm does not yield an optimal solution. Your set should include a penny so that there is a solution for every value of n.
b. Give an O(nk)-time algorithm that makes change for any set of k different coin denominations, assuming that one of the coins is a penny.

2. Linear Programming

Solve the following linear program using SIMPLEX:

Maximize $18x_1 + 12.5x_2$

Subject to

$$x_1 + x_2 \leq 20$$
$$x_1 \leq 12$$
$$x_2 \leq 16$$
$$x_1, x_2 \geq 0$$

3. FFT

Describe the generalization of the FFT procedure to the case in which n is a power of 3, Give a recurrence for the running time, and solve the recurrence.