Analysis of Algorithms: Assignment 8

Due date: April 19 (Wednesday)

Problem 1 (4 points)
Suppose that we need to schedule several lectures, using multiple lecture halls. For each lecture i, we know its start time s_i and finish time f_i. Two lectures can be in the same hall only if the corresponding time intervals do not overlap. We need to schedule all lectures, using *as few lecture halls as possible.* Write an efficient greedy algorithm for this problem, and determine its time complexity.

Problem 2 (3 points)
Imagine that you need to pay n cents, using the smallest possible number of coins. You have an unlimited supply of quarters, dimes, nickels, and pennies. Give an efficient algorithm that finds the minimal set of coins for a given amount n.

Problem 3 (3 points)
Using Figure 17.4(b) in the textbook as a model, draw an optimal-code tree for the following set of characters and their frequencies:

a:4 b:6 c:10 d:12 e:18 f:40 g:50 h:60

Problem 4 (bonus)
This problem is optional, and it allows you to get 2 bonus points toward your final grade for the course. You cannot submit this bonus problem after the deadline.

King Arthur once invited a number of knights to his castle, where they stayed for several days. Each evening, the king and his guests dined at the Round Table; in total, there were *twenty-three* people at the table. According to the king's decree, they took different seats on different evenings, and *no two people sat next to each other more than once.* When the knights could no longer satisfy this decree, they left the king's castle. What is the maximal number of days they could stay in the castle?