FALL 2007: **COT 5407** Intro. to Algorithms

[Homework 4; Due Nov 13 at start of class]

General submission guidelines and policies: Add the following statement and sign it: **I have adhered to the collaboration policy for this class and what I am presenting is my own work.** Without this statement, your homework will not be graded.

Problems

25. (**Exercise**) Solve Exercise 14.1-1 and 14.1-2, page 307.

26. (**Regular**) Solve Exercise 14.2-2, page 310.

27. (**Exercise**) Solve 16.3-2, page 392.

28. (**Exercise**) Solve 15.4-1, page 355.

29. (**Regular**) Give an explicit example that shows that the greedy algorithm of picking the item with the highest value to weight ratio is not the best strategy to solve the 0-1 knapsack problem discussed in class.

30. (**Exercise**) Read and understand the application described in Sections 15.1, 15.2, or 15.5.(**Regular**)

31. (**Regular**) In class, we discussed greedy and dynamic programming algorithms to solve the *activity selection problem*. Consider the following modification to the problem. Assume that you are going to be paid a bonus of v_i dollars, if you scheduled activity a_i. First show that a greedy algorithm will fail to find the optimal solution. Then design an algorithm to find a set of non-overlapping activities that would leave you with the largest possible bonus.

32. (**Extra Credit**) Recall the celebrity problem we discussed in class. Solve the following related problem: The police arrested a group of n young people during a recent event. They knew that all the people arrested were either from the Panthers gang or the Canes gang. They also knew that all the Panthers only spoke the truth, while the Canes could not be relied upon to tell the truth. The police were allowed to ask any arrested person A if person B was a Panther. Assume that all the arrested people knew who belonged to which gang. Assume that they only gave YES or NO answers to all the police questions. Assuming that there were less than $n/2$ Cane members among the people arrested, help the police to design an algorithm to ask the least number of questions in order to identify who were from the Canes gang and who were from the Panthers.