CS 3343 (Spring 2008) Assignment 8

Due: April 16 (Wed) before class starts

Your name: _____ Discussed with: _____

1. (35 points) Redo problem 2(c) and problem 3 of HW 7.
   Hint for problem 2(c): try to reuse the LCS algorithm rather than reinvent a new algorithm.

2. (15 points) Suppose you are consulting for a company which plans to build gas stations along a road. Along the road there are major intersections every 2 miles, which are potentially good locations for new gas stations. The gas stations at different intersections have different estimated profit. The company has decided not to build gas stations at adjacent major intersections, i.e., two gas stations will have to be at least 4 miles away from each other. Given the estimated annual profit for having a new gas station at each intersection, you are asked to provide an optimal plan that will result in the highest estimated total profit. (Hint: this can be considered as a simpler version of the restuarant loction problem discussed in class).

   a. Let $F(i)$ be the estimated total profit of the optimal plan that considers only intersections 1 to i. Write down the recurrence function for computing $F(i)$.

   b. Show how to use the recurrence function to find the optimal plan given the estimated profits below.

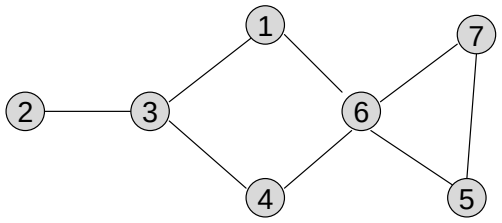
intersection	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
profit ($\times$ \$100k)	6	3	1	4	5	6	3	1	3	2	4	4	5	5	1

3. (10 points) (Modified from Exercise 16.2-4 in the textbook.) You are driving an automobile from San Antonio to Los Angeles along Interstate 10. Your car's gas tank, when full, holds enough gas to travel 200 miles, and you have a map that gives you the distances between gas stations on your route. You wish to make as few gas stops as possible along the way. Following your intuition, you decide to take a greedy approach: after you make a gas stop, you will then drive as far as you can and stop at the furthest gas station that is within 200 miles from the previous gas station.

Can you claim that your greedy strategy will indeed minimize the number of gas stops? If not, give an example that the strategy does not yield the optimal solution. Otherwise, briefly argue why it is optimal.

4. (10 points) Graph representations.

a. Show the adjacency list representation of the graph below.



b. Draw a graph that can be represented by the adjacency matrix below.

0	1	1	1	0	0	0
1	0	1	0	0	1	0
1	1	0	0	0	0	0
1	0	0	0	0	0	0
0	0	0	0	0	0	1
0	1	0	0	0	0	1
0	0	0	0	1	1	0