CIS 6331 Homework 5

Due: Wednesday, February 17 by class time

Midterm Exam I: Friday, February 19.
Topics: up to (including) dynamic programming.

Note: Write your algorithms in pseudo-code.

1. Consider the single-pair shortest path problem. We solved the problem using the forward approach. Now, solve it using the backward approach. Your answer must include: the definition of $f(x)$, a recurrence, boundary conditions, and the goal.

2. Implement the third approach of dynamic programming to the longest common subsequence problem. Your algorithm needs to print the actual longest common subsequence. Specifically, write two procedures: (1) a non-recursive procedure to compute $L(i, j)$, $1 \leq i, j \leq n$, and (2) a recursive procedure Longest$(i, j)$ such that Longest$(1,1)$ will print the longest common subsequence.

3. Consider the all-pair shortest paths problem. Suppose global arrays $D^k[1..n, 1..n]$ and $P^k[1..n, 1..n]$, $1 \leq k \leq n$, have been computed as in the straightforward implementation. Write a recursive procedure Path$(k, i, j)$ such that a call to Path$(n, i, j)$ will print the shortest path from $i$ to $j$. Note: a path is a sequence of vertices. You may print a vertex more than once (e.g., it is OK to print a path $(a, b, c, d)$ as $(a, a, b, c, c, c, d)$.)