Problem Set 6
(due Monday, December 7)

Problem 1 Let $G = (V, E)$ be a weighted digraph. Design an algorithm to list the vertices of a negative-weight cycle in $G$, if one exists. Your algorithm should run in time $O(mn)$.

Problem 2 Let $G$ be a weighted digraph, and let $s$ and $t$ be two vertices in $G$. The bottleneck of a path is the weight of the heaviest edge on that path. Design an algorithm to find the path from $s$ to $t$ of minimum bottleneck. Your algorithm should run in time $O(m + n \log n)$.

Problem 3 Let $G$ be a weighted digraph such that each edge is colored red or blue and such that each edge weight is nonnegative. Let $s$ and $t$ be two vertices in $G$. We are looking for the shortest path from $s$ to $t$ that consists of (zero or more) red edges followed by (zero or more) blue edges. Design an algorithm to solve this problem. Your algorithm should run in time $O(m + n \log n)$.

Problem 4 Let $A[1..n]$ be an array of integers. An increasing subsequence of $A$ is a subsequence of $A$ whose integers are in nondecreasing order. (For the definition of “subsequence”, see Section 16.3 of Cormen et al.) Design an algorithm to find the longest increasing subsequence of $A$. Your algorithm should run in time $O(n^2)$.

Problems worthy of attack
Prove their worth by fighting back.