CSE 6331, Fall, 2012
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CSE6331 Homework 5
Due Thursday, Oct. 04

1. Page 353:17-1 (a), (b), (c) (1st edition) Page 402: 16-1 (a), (b) (c) (2nd edition) Page 446: 16-1 (a), (b), (c) (3rd edition).

2. Let M be an $m \times m$ matrix of non-negative integers. An *independent* set of elements of this matrix is a set of elements such that no two elements lie in the same row or column. We wish to choose an independent set of elements whose sum is maximized.

   (a) Show that the following greedy algorithm does not solve this problem:

      1. while $M \neq 0$ do
      2. $L \leftarrow (i, j)$ where (i, j) is max element of M;
      3. Remove row i and column j from M;

   (b) Show that the greedy algorithm given above does produce an independent set whose sum is at least half the sum of the optimal solution.

3. The kth Fibonacci number is defined by the recurrence
   $F_0 = 0$
   $F_1 = 1$
   $F_k = F_{k-1} + F_{k-2}$ for $k \geq 2$.
   Prove that $F_{k+2} = \Sigma_{i=0}^{k} F_i + 1$.
   Prove that the ith Fibonacci number satisfies the equality $F_i = (\phi^i - \phi'^i)/sqrt5$ where $\phi = \frac{1+\sqrt{5}}{2}$ and $\phi' = \frac{1-\sqrt{5}}{2}$.

(The grader will only grade a subset of these problems.)