

**600.271 Automata & Computation Theory**  
**Assignment 8**  
**Due: April 26, 2012**

I. Problem Set 6, Problem 9 (page 136): (a), (g).

II. Prove that if problem  $A$  is Turing reducible to problem  $B$ , and  $B$  is r.e. then  $A$  is r.e.

III. Design a  $P$  time algorithm for the following problem.

Given a digraph  $G$ , for every pair of vertices  $u$  and  $v$  is there a path from  $u$  to  $v$  or a path from  $v$  to  $u$ ?

IV. Problem Set 7, Problem I, subproblem 12 (page 145): (Given a graph  $G$  and a value  $k$ , existence of  $k$  edges which don't share any end vertex is known as the *matching* problem. Assume that there is a polynomial time algorithm for the matching problem.)

V. Prove that the following problem is in NP by designing a non-deterministic polynomial time algorithm and also by designing a deterministic polynomial time verifier.

Given a sequence of numbers  $x_1, x_2, \dots, x_n$  and an integer  $k$ , can the numbers be partitioned into  $k$  blocks having equal sums?