Complexity Theory

Homework Set No. 6

Date Due: Dec 16th 2004

Please turn in the homework on time. Preferably - printed.

1. For the traversal of graphs we saw the there is a universal traversal sequence. It would be nice to have a '*universal*' collection of weights for the Isolation Lemma: a collection of size K of weight assignments where for $(w_1, w_2, \ldots w_m) \in W$ we have that $w_j \in \{1, \ldots, L\}$ and:

   1. K and L are polynomial in m
   2. For any set system (X, S) where the ground set X is of size m there exists a $(w_1, w_2, \ldots w_m) \in W$ that makes the minimum weight set unique in S.

   Show that no such collection exists. What if L is not required to be polynomial in m?

2. Use the Isolation Lemma to show an alternative randomized reduction to unique sat.

   You may find it most useful to consider the max clique problem

3. The #Clique problem is: given a graph G and an integer k, how many cliques of size k are there is G. Show that it is #P-Complete

4. We know that for determinants for any two matrices A and B: $det(AB) = det(A)det(B)$. Show that this does not hold the permanent: $per(AB) \neq per(A)per(B)$ in general.