CS281 Spring 2010: Homework 6

Due Wednesday, May 26th – in class

1. **(10 points)**
   The problem $4TA - SAT$ is defined as follows: Given a boolean expression E, does E have at least four satisfying truth assignments? Show that $4TA - SAT$ is NP-complete.

2. **(10 Points)**
   Give a polynomial time algorithm to solve the problem 2-SAT, i.e., satisfiability for CNF boolean expressions with only two literals per clause.
   $Hint$: If one of the two literals in a clause is false, the other is forced to be true. Start with an assumption about the truth of one variable and then chase down all the consequences for all the other variables.

3. **(10 Points)**
   Consider a family of 3-CNF expressions. The expression E_n has n variables, $x_1, x_2 \ldots x_n$. For each set of three distinct integers between 1 and n, say i, j and k, E_n has clauses $(x_i + x_j + x_k)$ and $(\bar{x}_i + \bar{x}_j + \bar{x}_k)$. Is E_n satisfiable for $n = 4$?