# Algorithmic Complexity

*CS601A* *Homework 4*
*Fall 2005* *Due: December 1, 2005*
*Prof. Rebecca N. Wright*

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If at all possible, please use an appropriate text-processing package to write up your solutions, such as LaTeX or MS-Word. If necessary, you may leave space for mathematical formulas and drawings and insert them by hand. If you are turning in your homework electronically, please convert it to pdf before turning it in.

Each problem is worth 15 points.

**Problem 1:**
In the Papadimitriou text, a corollary on p. 198 shows that TSP(D) is NP-complete via a reduction from HAMILTON PATH, but the proof that the reduction is actually a reduction is not given. Provide this proof.

**Problem 2:**
Show that if SAT $\in \mathbf{P}$, then you can actually find satisfying assignments in polynomial time. That is, given a deterministic polynomial time algorithm $\mathcal{A}$ for SAT as a black box, construct a polynomial-time algorithm that given a CNF Boolean expression $\phi$, returns "no" if $\phi$ is not satisfiable and returns a satisfying assignment if $\phi$ is satisfiable. (As usual, include the proof that your algorithm meets all its requirements.)