CS 262: Computational Complexity **Due: March 8, 2010**

Homework 6

Instructor: Sandy Irani

Do three of the following four problems:

1. Prove that if $\mathbf{NP} \subseteq \mathbf{BPP}$, then $\mathbf{NP} = \mathbf{RP}$. (*Hint:* use your **BPP** algorithm for SAT to give an **RP** algorithm for SAT by constructing a satisfying assignment).
2. Show that **BPP** and **RP** are closed under reductions.
3. Consider the problem whose input is a graph with integer weights and asks whether the minimum length tour is unique. For what class in the polynomial hierarchy is this problem complete? Prove your answer.
4. Show that if $\mathbf{NP} \subseteq \mathbf{TIME}(n^{\log n})$, then $\mathbf{PH} \subseteq \cup_{k \geq 1} \mathbf{TIME}(n^{\log^k n})$.