CS 520: Theory of Computation	Homework 3
Out: 03/13/08	**Due: 04/01/08**

Ground Rules

- **(Grading)** You will be graded on the correctness as well as clarity of your solutions. Please state and prove any assumptions or claims that you make.
- **(Collaboration)** You are allowed to discuss questions with other people in the class. However, **you must solve and write your answers yourself without any help**. You must also give explicit citations to any sources besides the textbook and class notes, including discussions with classmates.
- **(Lateness)** Late submissions do not get any credit.
- Start working on your homework early. Plan your work in such a way that you have the opportunity to put some problems on the back burner for a while and revisit them later. Good luck!

Problems

1. **(10 pts)** Prove that every r.e. language mapping reduces to A_{TM} and every decidable language mapping reduces to $\{0^n1^n \mid n \text{ is a non-negative integer}\}$.
2. **(14 pts)** Define a write-once Turing machine as a single-tape TM that can alter each tape square at most once (including the input portion of the tape). Prove that this variant Turing machine model is equivalent to the ordinary Turing machine model.

   (Hint: As a first step consider the case whereby the Turing machine may alter each tape square at most twice. Use lots of tape.)
3. **(8 pts)** Problem 4.15 in the book (pg. 184).
4. **(8 pts)** Problem 4.16 in the book (pg. 184).
5. **(10 pts)** Problem 4.28 in the book (pg. 184).