CS581 – Theory of Computation – HW8

Tuesday, May 28, 2013
due in class Tuesday, June 4, 2013

Answer each question below. You will turn this homework in using D2L. In addition, you may also turn in a paper copy in class. In this case the TA will mark up your homework with comments and return the comments to you.

You may format your answers using some document processing software, or you may write it up with pencil and paper and scan it. In either case submit a pdf document. Be sure your submission is clearly identified as Homework 8, and contains your name and your email on the first line. The first line should look like:

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1. **Silly PCP.** In the Silly Post Correspondence problem, SPCP, in each domino, the top string has the same number of characters as the bottom string. Show that SPCP is decidable.

2. Show that A is decidable if $A \leq_m 0^*1^*$.

3. Show that A is Turing recognizable if $A \leq_m A_{\text{TM}}$.

4. Consider the problem of determining whether a PDA accepts some string of the form $\{ww \mid w \in \{0,1\}^*\}$. Use the computation history method to show that this problem is undecidable.

5. **The Recursion Theorem.** Describe two different Turing Machines M and N, that, when started on any input M outputs $< N >$ and N outputs $< M >$.

6. In the fixed-point version of the recursion theorem, let the transformation t be a function that interchanges the states q_{accept} and q_{reject}. in Turing Machine descriptions. Give an example of a fixed point for t.