Problem Set 7 – Due Friday, May 16, 2014

Instructions. For this problem set, please work in teams of 2–3 people.

Problem 1. Design a Turing machine that decides the language $L = \{x#y : x, y \in \{0, 1\}^+ \text{ and } x \text{ and } y \text{ are equal-length strings that differ on a single character}\}$. For example, 010#011 and 1111#1011 are in $L$, while 010#111, 1111#111, #, and 11##01 are not. If the input string is in $L$ your TM must leave the tape blank except for a 1; if the input string is not in $L$, it must leave the tape blank except for a 0. Rather than following the conventions of your book, please employ those of the website http://morphett.info/turing/turing.html. In particular, you’ll assume a two-way infinite tape. Try to make your program use as few rules as possible, measured by the number of 5-tuples that you need. Test your machine on plenty of inputs. A prize will go to the smallest correct machine.

Submit your solution, one per group, by 10:40 am, in the SmartSite Drop Box. The solution must be in the runnable format of the website above. The TA will test it on various inputs of his/her choosing. A comment at the top of your program must list the names of the team members, in alphabetical order by last name; and the number of rules you used. Please use the Drop Box of the alphabetically-first student in your group (alphabetical by last name, of course). Please do not put your solution in the Drop Box of any other student in the group.