Exercises for Computability and Complexity, Spring 2014, Sheet 1

Return Friday Feb 14, in class

Note: you may team up in teams of two (return only one sheet per team and indicate both names on it)

Exercise 1 Give a formal definition of a version of TMs that use a 2-dimensional grid of memory cells instead of a 1-dimensional tape. Repeat definition 3.1, give an informal specification of how to deal with special "tape" symbols and how to administer input to the TM and how to read out output, and define what a configuration is. As usual with such definition exercises, the objective is formal rigour, not that you hit "the correct" way to define such TMs.

Exercise 2 Give a transition table for a TM that decides the language $L = \{0^n 1^{2n} \mid n \geq 0\}$. You may use single-tape or multiple-tape TMs (the latter is easier!). Your table need only contain transitions that are actually used. Explain in words how your TM operates. Comment each transition in your table.