6.045J/18.400J: Automata, Computability and Complexity Prof. Nancy Lynch

Recitation 13: Space Complexity

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Readings: Sections 8.2, 8.3

Outline for Today:

Problem 1: Let us look at the problems in Fake Homework 10.

Problem 2: (Sipser 8.11) Let A be the language of properly nested parentheses. For example, (()) and (()(()))() are in A, but)(is not. Show that A is in L.

Problem 3: Suppose we are given a Quantified Boolean Formula of the form $\forall x_1 \exists x_2 \forall x_3 \ldots \exists x_n Q(x_1, x_2, \ldots, x_n)$. Why is this (possibly) not in NP ? What is the possible certificate that you can produce to prove that this QBF formula is true ?

SAT formulae (of the kind we saw when we talked about P and NP) are special cases of QBFs. They are QBFs of the form $\exists x_1 \exists x_2 \ldots Q(x_1, x_2, \ldots, x_n)$.

Problem 4: Games – The formula game, Geography Game, Othello (Reversi), Checkers, ... If we get time, we will show that the Geography game is PSPACE-hard.