CSE 431: Introduction to Theory of Computation Spring 2005

Problem Set 2

Due Friday, April 15, 2005, in class

Reading assignment: Sipser's book, Chapters 3 and 4.

Instructions: Same as for Problem set 1.

Each question is worth 10 points. Please be as clear and concise as possible in your arguments and answers. The optional problem is for extra credit.

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1. Problem 3.9, Sipser's book.
2. Let S be an infinite, Turing-recognizable language. Prove that S has an infinite, decidable subset.
3. Define the language

$$A = \{ \langle M \rangle \mid M \text{ is a nondeterministic finite automaton (NFA) that only accepts palindromes in } \{0,1\}^* \} .$$

(Note that for $\langle M \rangle$ to be in A, it need *not* accept all palindromes, but any string it accepts must be a palindrome.) Prove that A is **decidable**.

4. Problem 4.21, Sipser's book.
5. * **(Optional problem)** Show that single-tape TMs that cannot write on the portion of the tape containing the input can only recognize regular languages.