CSE 431 Spring 2006
Assignment #2

Due: Friday, April 14, 2006

Reading assignment: Read Chapter 4 of Sipser's text.

Problems:

1. Prove that a language is decidable if and only if there is an enumerator that enumerates it in lexicographic order. (Hint: Handle the case where the language is finite separately from the case when it is infinite.)

2. Use the above to show that any infinite Turing-recognizable language contains an infinite decidable subset.

3. Let $S = \{\langle M \rangle \mid M$ is a DFA that accepts w^R whenever it accepts $w\}$. Show that S is decidable.

4. Let $INFINITE_{PDA} = \{\langle M \rangle \mid M$ is a PDA and $L(M)$ is an infinite language$\}$. Show that $INFINITE_{PDA}$ is decidable.

5. Show that the set of complex numbers,

   $QUADRATIC\text{-}ROOT = \{x \in \mathbb{C} \mid$ there are integers $a \neq 0$, b, and c such that $ax^2+bx+c = 0\}$

   is countable.

6. (Bonus) Let C be a language. Prove that C is Turing-recognizable iff there is a decidable language D such that $C = \{x \mid \exists y$ such that $\langle x, y \rangle \in D\}$.