Math 387

Homework 5

Due Friday, October 9

Practice exercises from the book

5.1, 5.10

Problems

1. Let $L = \{< M > \mid M$ is a TM that accepts w^R whenever it accepts w$\}$. Is L decidable? Prove your answer.
2. Let $NONHALT = \{< M, w > \mid M$ will *not* halt on input $w\}$. Is $NONHALT$ decidable? Prove your answer.
3. A "useless state" is a state in a Turing machine that is never used on any input. Formulate the problem of checking whether a Turing machine has any useless states as a language. Show that this language is undecidable.
4. Let $S = \{< M > \mid M$ is a TM and $L(M) = \{< M >\}\}$. Show that neither S nor $\bar{S}$ is recognizable.

Bonus problems

1. Write a program (in any programming language) that prints its own code to the screen. The program cannot interact with the file that contains the program. (It can't, for example, read or copy the file that contains its code.)