9 Homework

Due: Thursday, April 4, 2013.

Problems

Required: 4 of the following 5 problems
Points: 25 points per problem

1. Do the Problem 5.1
   Show that $EQ_{CFG}$ is undecidable.

2. Do the Problem 5.9
   Let $T = \{ < M > \mid M$ is a TM that accepts $W^R$ whenever it accepts $w \}$. Show that $T$ is undecidable.

3. Do the Problem 5.20
   Prove that there exists an undecidable subset of $\{1^*\}$.

4. Use a mapping reduction to prove that
   $DECIDER_{TM} = \{ < M > \mid M$ is a TM and $M$ is a decider $\}$
   is undecidable.

5. Prove that $REGULAR_{TM}$ (defined on p. 191 of Sipser) is neither Turing-recognizable nor co-Turing-recognizable. Hint: For part of this you should create one new mapping reduction.