

**Assignment 8**  
*Computer Science 235*

**Reading.** Sections 5.1 and 5.3

- 1) Show that  $EQ_{CFG}$  is undecidable.
  
- 2) Show that  $EQ_{CFG}$  is co-Turing-recognizable.
  
- 3) If  $A \leq_m B$  and  $B$  is a regular language, does that imply that  $A$  is a regular language? Why or why not?
  
- 4) Let  $T = \{ \langle M \rangle \mid M \text{ is a TM that accepts } w^R \text{ whenever it accepts } w \}$ . Show that  $T$  is undecidable.
  
- 5) Consider the problem of determining whether a single-tape Turing machine ever writes a blank symbol over a nonblank symbol during the course of its computation on any input string. Formulate this problem as a language and show that it is undecidable.
  
- 6) Consider the problem of determining whether a Turing machine  $M$  on an input  $w$  ever attempts to move its head left when its head is on the left-most tape cell. Formulate this problem as a language and show that it is undecidable.