

## CSE 725 - Problem Set 2

### Due lecture on May 16th

Problem numbers are from the second edition of Sipser's book. If unsure about which problem to solve, ask. Collaboration is permitted; looking for solutions from external sources (books, the web, material from previous years, etc.) is prohibited.

1. 5.9  
( $w^R$  is the reverse of  $w$ )
2. 5.22
3. 5.25 (Hint: 5.24)
4. Prove that the following language is undecidable:

$$A = \{\langle M \rangle : M \text{ is a TM that runs in polynomial time}\}.$$

5. 7.13
6. Let  $coNP$  be the class of languages whose complement is in  $NP$ . Show that  $P \subseteq NP \cap coNP$ . Show that if  $P = NP$  then  $P = coNP$ . (Warning:  $coNP$  is *not* the complement of  $NP$ .)