

# CSE 6321 - Problem Set 5

## Due beginning of lecture on March 14th

Problem numbers are from the third 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. 7.46 (7.44 in second edition, about MIN-FORMULA)
2. Read the definition of MIN-FORMULA from Problem 1.
  - (a) Show that  $MIN - FORMULA \in PSPACE$ .
  - (b) Explain why this argument fails to show that  $MIN - FORMULA \in coNP$ : If  $\phi \notin MIN - FORMULA$ , then  $\phi$  has a smaller equivalent formula. A NTM can verify that  $\phi \in \overline{MIN - FORMULA}$  by guessing that formula.
3. 8.10 (8.10 in second edition, about go-moku)
4. Show that if every NP-hard language is also PSPACE-hard, then  $PSPACE = NP$ .