QUIZ -2

Theory of Computation

14/9/2017

1. *[4 marks]* Let $L_1, L_2 \subseteq \Sigma^*$. Are the following statements true/false. Argue why.

   (a) If $L_1 \subseteq L_2$ then $\equiv_{L_1}$ refines $\equiv_{L_2}$

   (b) If $L_1 \subseteq L_2$ then $\equiv_{L_2}$ refines $\equiv_{L_1}$

   (c) If the minimal DFA for L_1 has fewer states than that of L_2 then $\equiv_{L_1}$ refines $\equiv_{L_2}$

   (d) If the minimal DFA for L_1 has fewer states than that of L_2 then $\equiv_{L_2}$ refines $\equiv_{L_1}$

2. *[2 marks]* Let $L_1 = \{a^n b^n \mid n \geq 0\}$ and $L_2 = \{w \mid w$ has equal number of a's and b's $\}$. How does $\equiv_{L_1}$ and $\equiv_{L_2}$ compare with respect to the refinement relation.

3. *[4 marks]* Is the following language regular? If yes, provide the Nerode automaton, and a proof of non-regularity otherwise.

   - $L = \{w \mid w = uv = vu$ for some $u, v \in \Sigma^* \setminus \{\epsilon\}\}$