# CS21004 - Tutorial 5

February 2, 2019

Instructions: For the problems with (**To submit**), please write the answers neatlyin loose sheets and submit to the TA before the end of the tutorial.

1. Show the following languages are not regular language using Pumping Lemma

   (a) $L = \{a^n \mid n$ is a perfect square $\}$

   (b) $L = \{0^i x \mid i \geq 0,\ x \in \{0,1\}^*$ and $|x| \leq i\ \}$ (**To submit**)

   (c) $L = \{w \mid n_a(w) \neq n_b(w)\}$. (**To submit**)

   (d) $L = \{0^n (12)^m : n \geq m \geq 0\}$ (**To submit**)

   (e) $L = \{w : w$ has balanced parentheses$\}$ (Home)

   (f) $L = \{a^{n!} \mid n \geq 0\}$ (Home)

2. Minimize the following DFAs (**Submit the second one**)
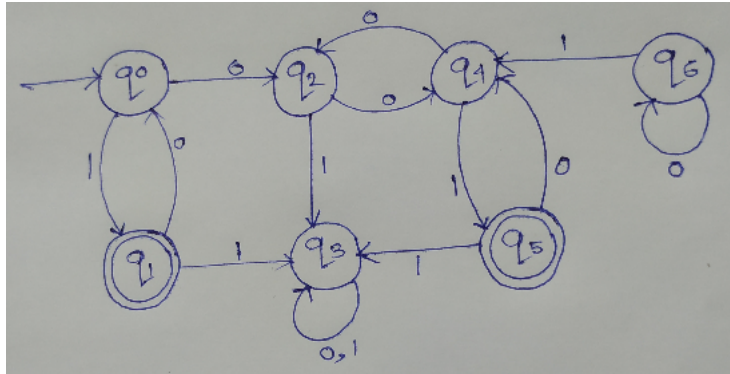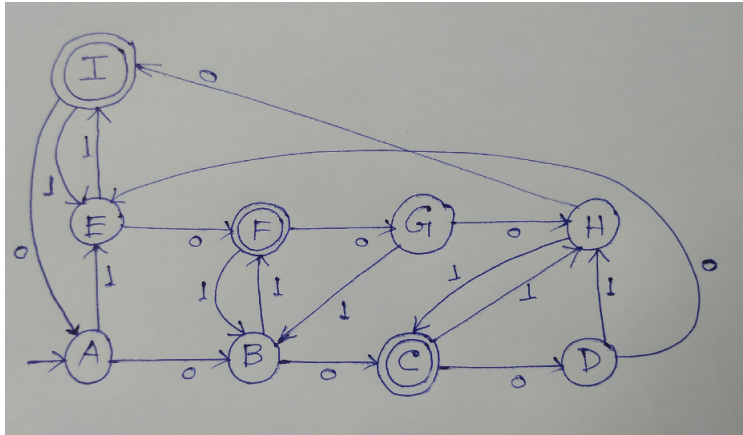
3. Provide an algorithm for converting a left linear grammar to a right linear grammar. (Home)

4. Show that the family of regular languages is closed under symmetric difference. (Home)