CS5338 – Formal Languages

Spring 2019 – Assignment 4

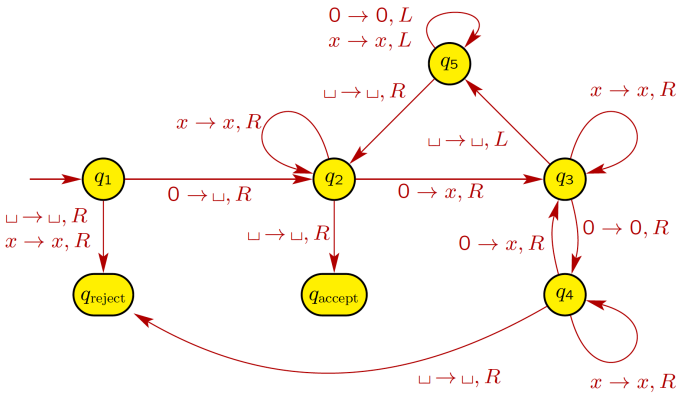
Due: April 12, 2019

1. *(20 pts)* Convert the following CFG into an equivalent CFG in Chomsky normal form.

$$A \longrightarrow BAB \mid ABA \mid B \mid \varepsilon$$
$$B \longrightarrow 00 \mid \varepsilon$$

2. *(20 pts)* Use the pumping lemma to prove that the language A = $\{0^{2n}\ 1^{3n}\ 0^{n} \mid n \geq 0\}$ is not context free.

3. (*30 pts*) The Turing machine M below recognizes the language A = $\{0^{2^n} \mid n \geq 0\}$.



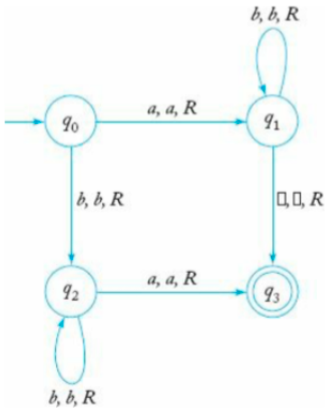
In each of the parts below, give the sequence of configurations that M enters when started on the indicated input string.

(a) 00

(b) 000000

4. (*20 pts*) Construct a Turing machine that accepts the complement of the language L = L (aaaa* b*).

5. (*10 pts*) What language is accepted by the Turing machine whose transaction graph is in the figure below?



Note: Submit your answers to TRACS. No hard copies.