Name: Rollno:

CSE340: Theory of Computation (Quiz 1)

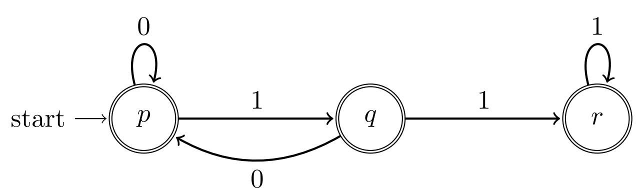
14th August, 2017

Total Number of Pages: 2 Total Points 30

Instructions

1. Cheating or resorting to unfair means will be severely penalized.
2. Using pens (blue/black ink) and not pencils. Do not use red pens for answering.

Question 1. (5 points) Describe the language accepted by the following finite automata in the simplest possible form.



$\{w \in 0,1^* |$ ____________________________________ $\}$

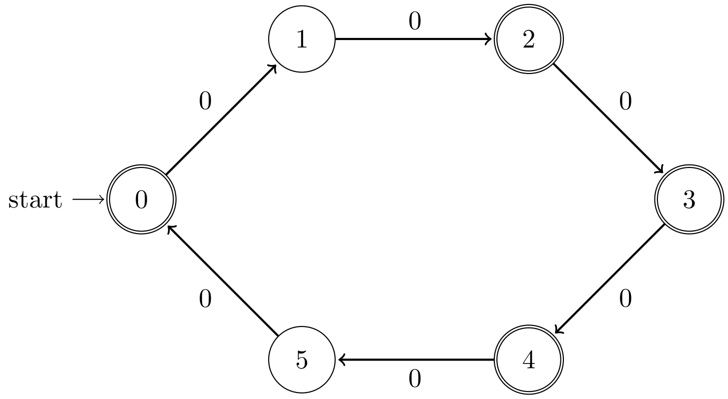
Solution:

$\{w \in \{0,1\}^* \mid w$ does not contain 110 as a substring$\}$

Question 2. Design a DFAs that accepts the following languages

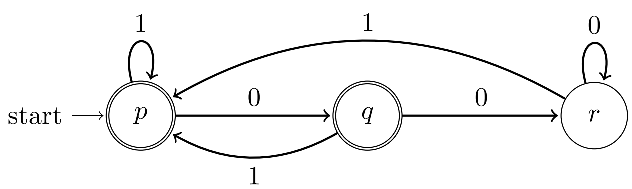
(a) (5 points) $L_1 = \{w \in 0^* \mid |w|$ is divisible by 2 or 3$\}$

Solution:



(b) (5 points) $L_2 = \{w \in \{0,1\}^* \mid w \text{ does not end with } 00\}$

Solution:



Question 3. (10 points) State whether the following statements are true or false (T/F).

(a) **T** Every regular language has an NFA with a single accept state.

(b) **F** The minimum number of state in a DFA corresponding to an NFA with n states is 2^n.

(c) **F** Every language has at least one DFA accepting it.

(d) **T** An NFA accepts its input if all computation paths end at an accept state.

(e) **T** Complement of a regular language is regular.

Question 4. (5 points) Let $N = (Q, \Sigma, \delta, q_0, F)$ be an NFA with no ϵ-transitions and $w = a_1 \ldots a_n$ be a string of length n over Σ. Then the number of computation paths of N on w is at most ________.

Solution: $|Q|^n$