Name: _____   Rollno: _____

CSE340: Theory of Computation (Quiz 1)

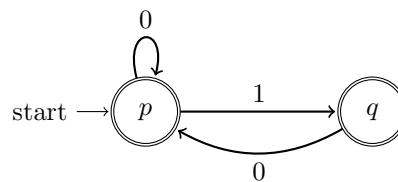### 13th August, 2019

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.

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

> **Solution:**
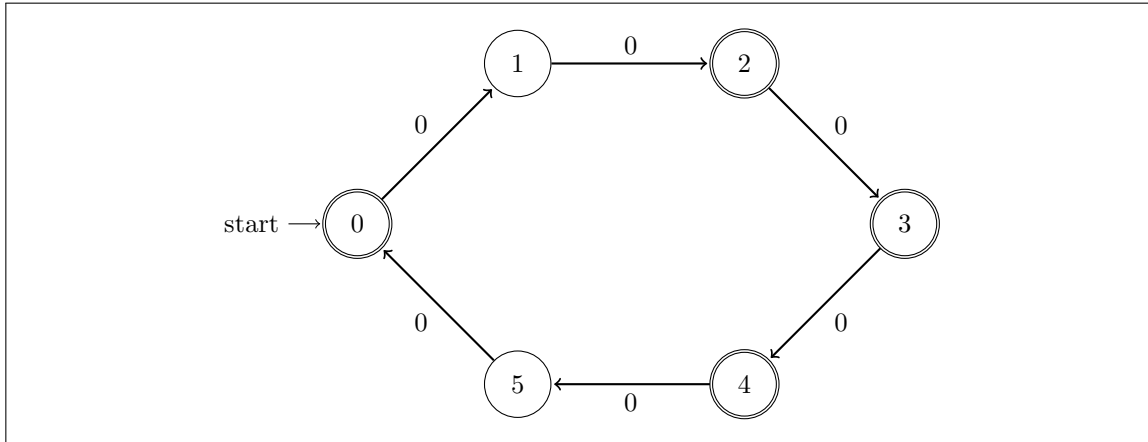> $$\{w \in \{0,1\}^* \mid w \text{ does not contain } 11 \text{ as a substring}\}$$

Question 2. Design a DFAs that accepts the following languages

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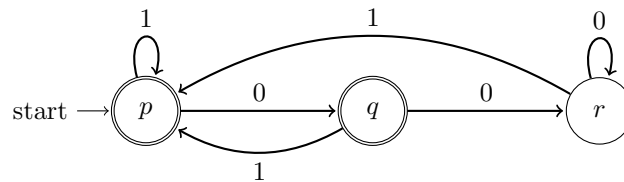
> **Solution:**

(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: $|Q|^n$