CSE340: Theory of Computation (Homework Assignment 2)

Due Date: 11th September, 2021, 11:59 PM

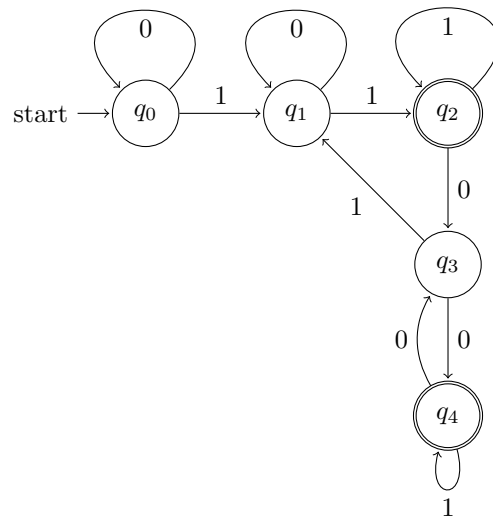Total Number of Pages: 2   Total Points 50

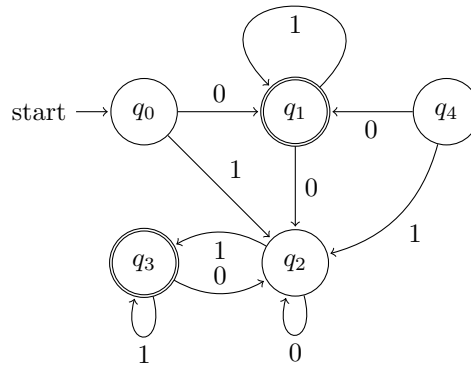**Question 1**. (12 points) Give regular expressions for the following languages.

(a)
$$L_1 = \{x \in \{0,1\}^* \mid x \text{ does not contain the substring } 101\}$$

(b)
$$L_2 = \{x \in \{0,1\}^* \mid x \text{ has at most two 0's and at most three 1's}\}$$

Question 2. (8 points) Give regular expression corresponding to the following DFA.

Question 3. (6 points) Minimize the given DFA and show all steps.

Question 4. (14 points) Give CFGs for the following languages.

(a) $L_1 = \{a^m b^n c^n d^{2m} \mid n, m \geq 0\}$

(b) $L_2 = \{a^n b^m \mid n \neq m\}$

Question 5. (10 points) Show that the following language is not regular.

$$L = \{a^n b^m \mid \gcd(i, j) = 1 \text{ and } n, m \geq 0\}$$