Indian Statistical Institute

Semester-II 2012-2013

M.Tech.(CS) - First Year

Class Test I (8 February, 2013)

Subject: Automata, Languages and Computation

Total: 20 marks

To change an answer, scratch out the old answer and write the new answer clearly. Do NOT overwrite.

Name: _____ **Roll:** _____

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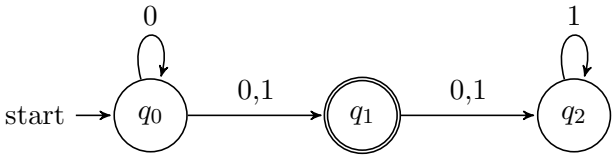
1. Suppose the following non-deterministic finite automaton (NFA) is converted to an equivalent deterministic finite automaton (DFA) using the standard algorithm. [4]



Determine whether each of the following statements is true or false.

(a) $\delta(\{q_1\}, 0) = \{q_1, q_2\}$. TRUE / FALSE

(b) $\delta(\{q_2\}, 0) = \{\varnothing\}$. TRUE / FALSE

(c) The state $\{q_0, q_2\}$ is unreachable. TRUE / FALSE

(d) The state $\{q_0, q_1, q_2\}$ is a final state. TRUE / FALSE

2. Write down the regular expression for hexadecimal numbers in C. [4]

Answer:

3. The language $L = \{0^p | p \text{ is prime } \}$ is not regular. If you have to prove this using the Pumping Lemma, how many times should you pump v? Your answer should be in terms of the lengths of u, v, w (u, v, w have their usual significance). [6]

Answer:

P.T.O.

4. Let $M_1 = (Q_1, \Sigma, \delta_1, q_0^{(1)}, F_1)$ and $M_2 = (Q_2, \Sigma, \delta_2, q_0^{(2)}, F_2)$ be two DFAs. Describe DFAs $M_\cup$ and $M_\cap$ that accept, respectively, $L(M_1) \cup L(M_2)$ and $L(M_1) \cap L(M_2)$. [6]

	$M_\cup$	$M_\cap$
States		
Alphabet		
Transition		
Initial state		
Final states		