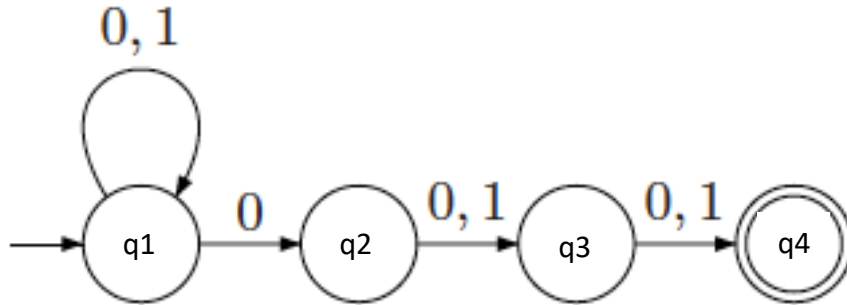


Theory Of Computation – Final Fall 2020

Time: 2 hours **Total:** 60 points

NFA – DFA:

1. [10 points] Consider the following NFA over the alphabet $\{0, 1\}$,



Give an equivalent DFA for the NFA. Name states of the DFA appropriately and provide a transition table you used to convert the NFA to DFA

2. [10 points] Prove that the language $L = \{0^i 1^j \mid i, j \geq 0 \text{ and } i \neq j\}$ is not regular.

Context Free Languages:

1. [10 points] Give pushdown automata that recognize the language $L = \{a^i b^j c^k \mid i, j, k \geq 0 \text{ and } i + j = k\}$.
2. [10 points] Let $L = \{w\#x \mid w \text{ is a substring of } x\}$. Show that L is not a context-free language

Turing Machines:

1. [10 points] Construct a state transition diagram of a Turing Machine that decides the language $L = \{a^{2i} b^i c^{2i} \mid i > 0\}$.
2. [10 points] Give implementation-level descriptions of Turing machines that decides the language $L = \{w \mid w \text{ does not contain twice as many 0's as 1's}\}$