CIS 306 **Quiz 4** **Discrete Structures II**

Name: __Demetrius Johnson_____FEB 16, 2021_____

No calculators are allowed. Show your work. The points for each problem are indicated. Problems with incomplete work may receive partial, or no credit.

COs: [Question 1]

Points: _____ **/ 15**

CS Grammar

1. [10 pts] Draw a Turing Machine state transition diagram for the language of { all binary strings **containing** the substring 101} //obviously our input alphabet is binary {0, 1}

$\Sigma = \{0, 1\}$ // λ implied

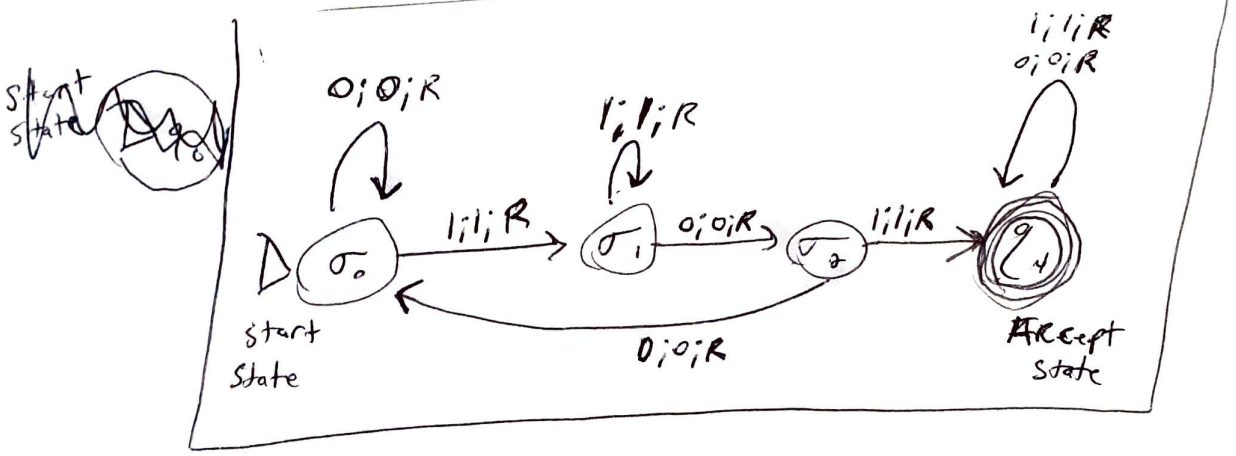
~~RE = (1+0)*(101)(1+0)*~~

Defined by:

$RE = (1+0)^*(101)(1+0)^*$

Read - Write - Move

TM



2. [5 pts] Give the configuration after applying the ***appropriate*** transition function, using the symbols a, b, c. Only apply the transition function **once**. PICK THE CORRECT TRANSITION FUNCTION, and apply it, giving your final configuration

Assume your **original configuration** is: **abbaq₁bba**

Transition functions available:

- **δ(q₁, a) = (q₂, a, R)**
- **δ(q₁, b) = (q₃, c, L)**
- **δ(q₃, a) = (q₄, c, R)**

original: $abbaq_1bba$ (Reading)

→ This function is for when Read head is reading a "b"; (and a f(x) for state q_1)

Resultant configuration after applying $\delta(q_1, b)$ → if in state "1" and reading a "b", move to state "3" by first writing a "c" over current read of "b", then move to the Left.

- $abbaq_1bba \rightarrow \delta(q_1, b) = (q_3, c, L) \rightarrow$ **$abbq_3acba$**

Solution

After Applying 1 trans. Function Once; using the appropriate f(x) from the start state and Position given.