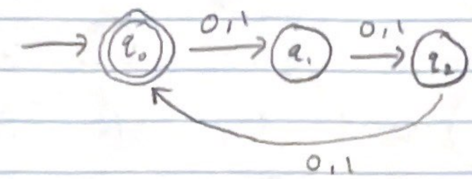
Sujay Jakka

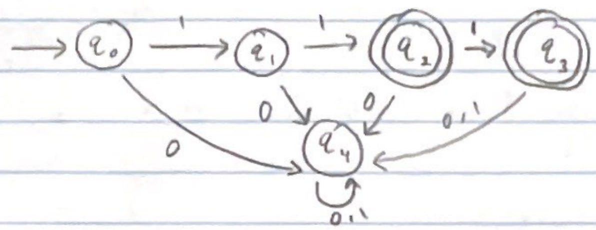
Homework #2

Problem 1

1. $A = \{w \mid \text{length of } w, |w|, \text{ is a multiple of } 3\}$

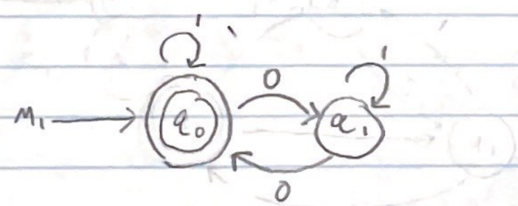


2. $B = \{11, 111\}$

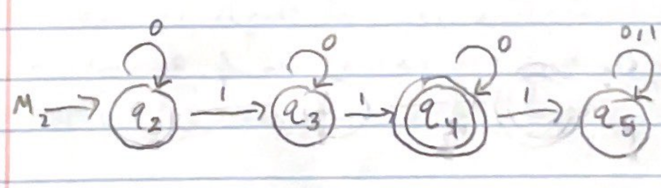


3. $C = \{w \mid w \text{ contains an even number of 0's and contains exactly two 1's}\}$

$M_1 = \{w \mid w \text{ contains an even number of 0's}\}$

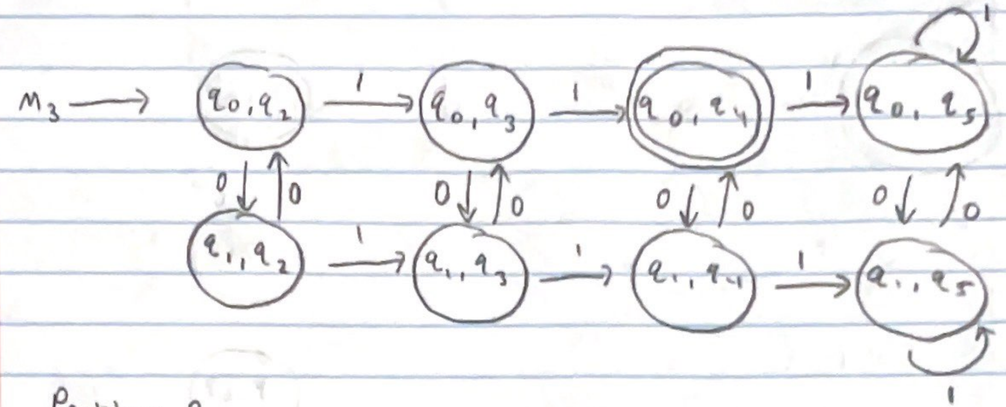


$M_2 = \{w \mid w \text{ contains exactly two 1's}\}$



$C = M_3 = M_1 \cap M_2$

3 continued



Problem 2

Prove that regular languages are closed under the set difference operation. That is, if A and B are regular languages, then A-B is also a regular language.

Proof: We assume that A and B are regular languages, and we shall prove that regular languages are closed under the set difference operation, A-B, by using construction (direct proof).

A-B can be written as $A \cap \overline{B}$. If B is a regular language, then the complement of the set B is also a regular language by the closure of regular languages (complement). If set A is a regular language and set $\overline{B}$ is a regular language than the intersection of sets A and $\overline{B}$ is also a regular language by the closure of regular languages (intersection).

This proves that $A \cap \overline{B}$ is a regular language, when A and B are regular languages. $A \cap \overline{B}$ is equal to A-B which proves that regular languages are closed under the set difference operation. ∎