COMP 335 Assignment 3

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Question 1.

(a)
There are 10 strings of length at most 3 that are in L(r):
000, 1, 11, 111, 0, 00, 011, 110, 101, λ

(b)
There are 5 strings of length at most 3 that are not in L(r)
01, 10, 001, 010, 100

(c)
The language has number of 0's divisible by 3 or number of 1's divisible by 2.
Another way of saying this would be that the language has an odd number of 1's or even number of 1's.

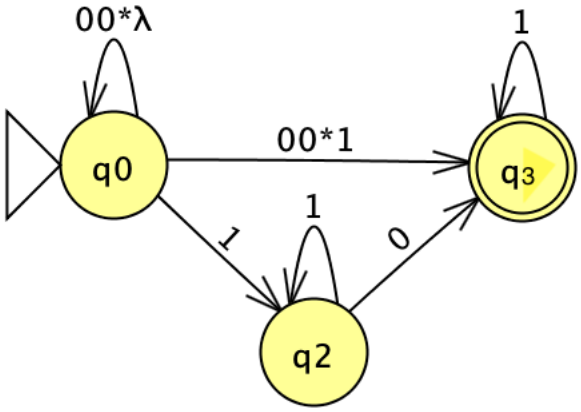
Question 2.

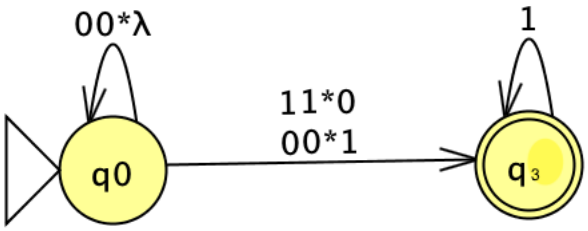
Let r represent a regular expression for the set of all strings on the alphabet a, b with no runs of length greater than 3.

$\therefore$ a valid way of writing r would be:
r = (λ + b+bb+bbb)((a+aa+aaa)(b+bb+bbb))*(λ + a+aa+aaa)

Question 3.

Simplifying the given NFA we get:





From the above diagram we can infer the regular expression r to be represented as:
r = $(00^*)^*(11^*0+00^*1)(1)^*$

Question 4.

The left side of the diagram represents: (a^*b+b^*a)
The left side of the diagram represents: $((ab)^*+(ba)^*)^*$
Together they form: $(a^*b + b^*a)((ab)^*+(ba)^*)^*$