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February 13, 2023

COMP 4200

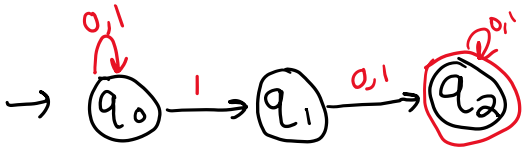
Assignment 3

Problem 1

Total: 30 points (10 points each)
Construct NFAs that recognizes the following languages:

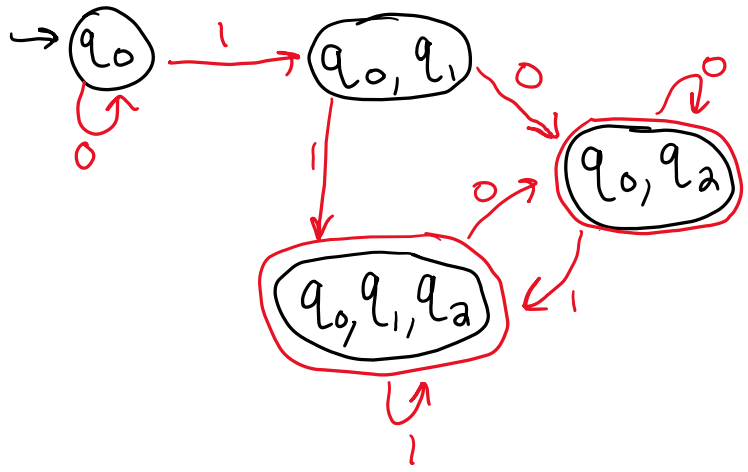
1. All binary numbers that contain a 1 in the 3rd location from the right (e.g. **1**00, 10**1**11, ...)

NFA



State	0	1
Q0	Q0	Q0,Q1
Q0,Q1	Q0,Q2	Q0, Q1, Q2
Q0, Q2	Q0, Q2	Q0, Q1, Q2
Q0, Q1, Q2	Q0, Q2	Q0, Q1,Q2

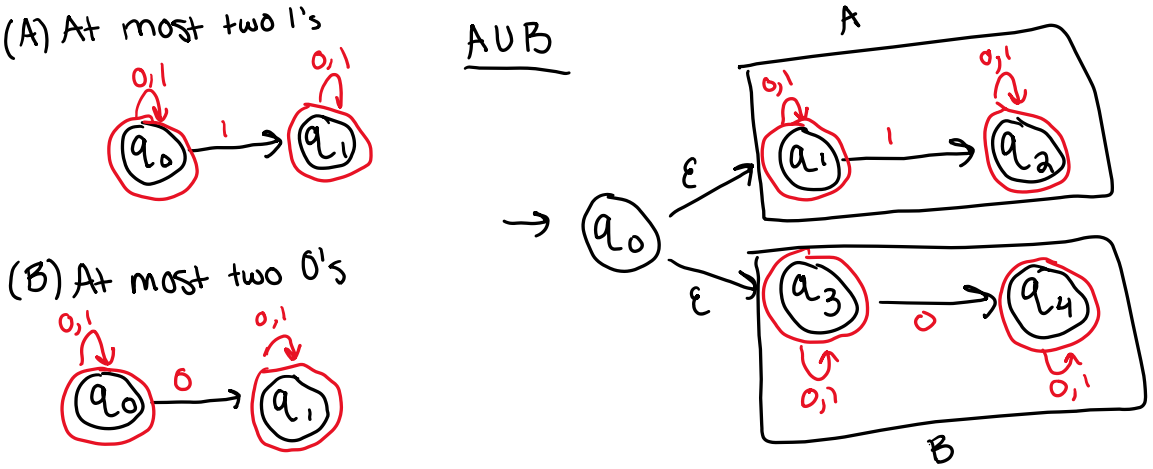
DFA



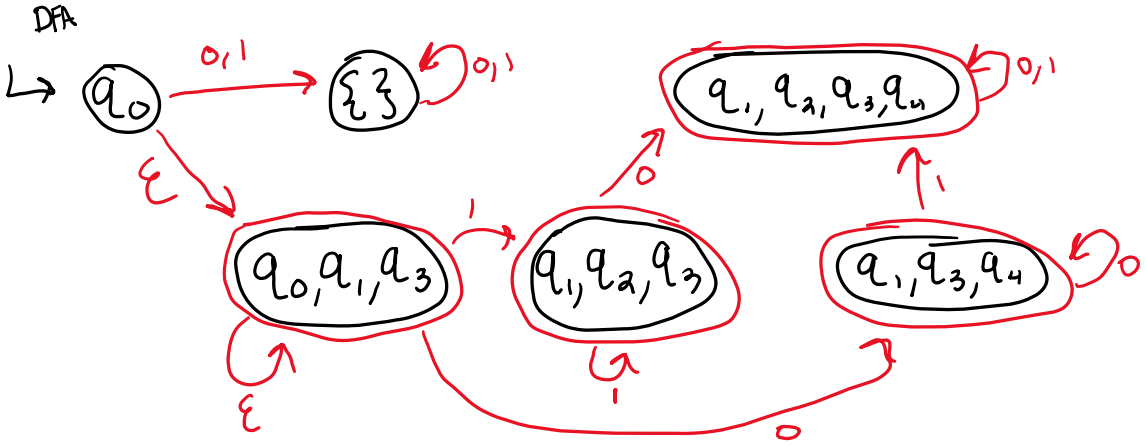
Problem 1

Total: 30 points (10 points each)
Construct NFAs that recognizes the following languages:

2. All binary numbers that contain at most two 1's or contain at most two 0's (e.g. ϵ, 111**01**, 0**1**000, ...)



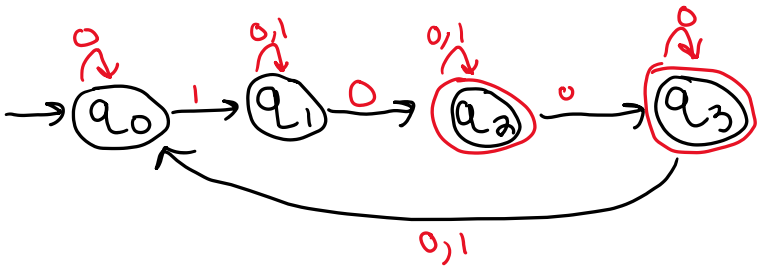
State	0	1	Ɛ
Q0	{}	{}	Q0,Q1,Q3
{}	{}	{}	N/A
Q0,Q1,Q3	Q1,Q3,Q4	Q1,Q2,Q3	Q0,Q1,Q3
Q1,Q2,Q3	Q1,Q2,Q3,Q4	Q1,Q2,Q3	N/A
Q1,Q3,Q4	Q1,Q3,Q4	Q1,Q2,Q3,Q4	N/A
Q1,Q2,Q3,Q4	Q1,Q2,Q3,Q4	Q1,Q2,Q3,Q4	N/A



Problem 1

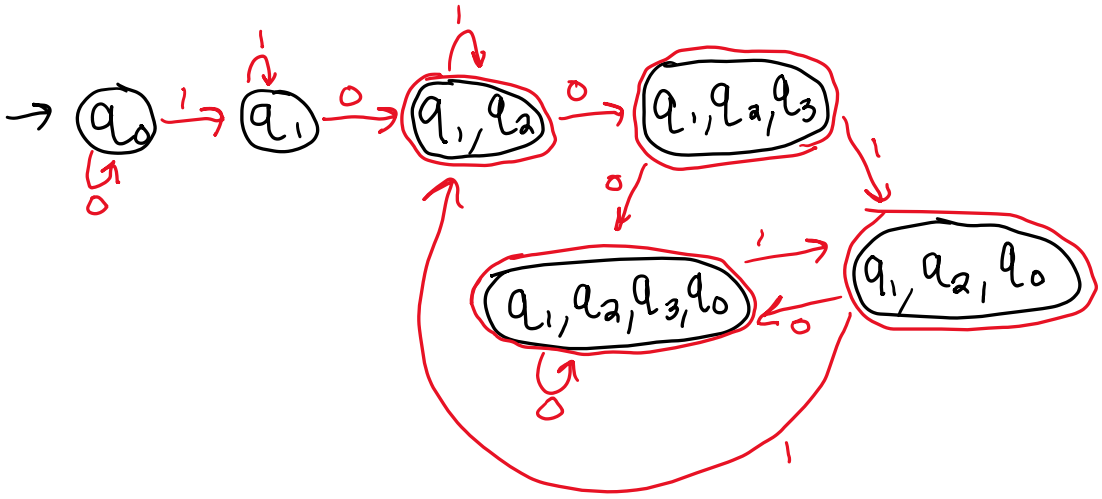
Total: 30 points (10 points each)
Construct NFAs that recognizes the following languages:

3. All binary numbers that can be divided by 4.



State	0	1
Q0	Q0	Q1
Q1	Q1,Q2	Q1
Q1,Q2	Q1,Q2,Q3	Q1,Q2
Q1,Q2,Q3	Q1,Q2,Q3,Q0	Q1,Q2,Q0
Q1,Q2,Q3,Q0	Q1,Q2,Q3,Q0	Q1,Q2,Q0
Q1,Q2,Q0	Q1,Q2,Q3,Q0	Q1,Q2

DFA



Problem 2

Total: 30 points
Via subset construction, construct DFAs from all three NFAs that were constructed in problem 1. You must show the transition tables of the DFAs you construct and their state diagram.

Seen each of the part of problem 1 to see DFAs.