COMP-4200

Formal Languages

FROM: Midas Oden

TO: Dr. Anh Nguyen

DATE: September 15, 2021

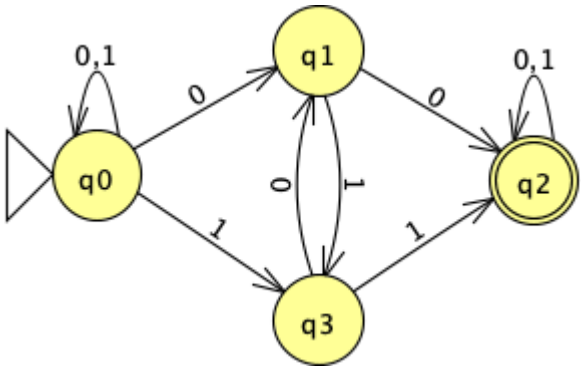
LAB SECTION: 001

Homework #3

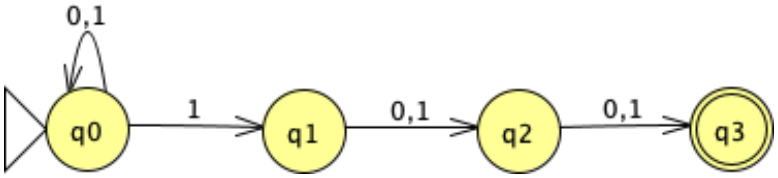
Problem 1

Construct NFA that recognizes following languages:

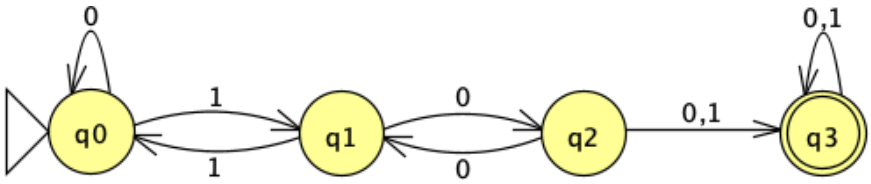
1. All binary numbers that contain 00 or 11 — NFA



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



3. All binary numbers that can be divided by 3 — NFA

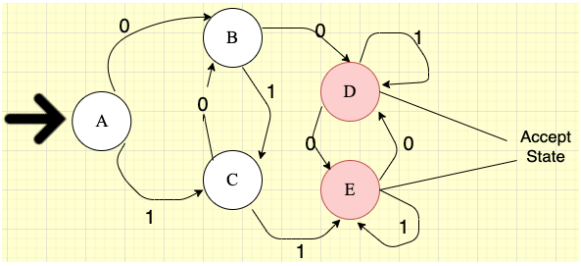


Problem 2

Via subset construction, construct DFAs from all three NFAs that were constructed in problem 1. Please show step-by-step solutions.

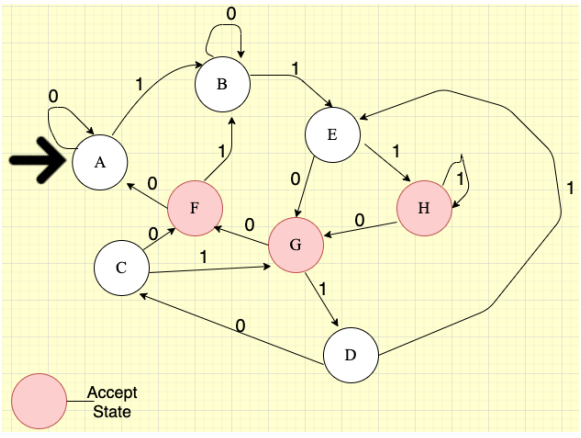
1. All binary numbers that contain 00 or 11 — DFA

Problem 2.1 DFA	0	1
q_0	q_0, q_1	q_0, q_2
q_0, q_1	q_0, q_1, q_3	q_0, q_2
q_0, q_2	q_0, q_1	q_0, q_2, q_3
q_0, q_1, q_3	q_0, q_1, q_3	q_0, q_2, q_3
q_0, q_2, q_3	q_0, q_1, q_3	q_0, q_2, q_3



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

Problem 2.2 DFA	0	1
q_0 — A	q_0	q_0, q_1
q_0, q_1 — B	q_0, q_2	q_0, q_1, q_2
q_0, q_2 — C	q_0, q_3	q_0, q_1, q_3
q_0, q_1, q_3 — D	q_0, q_2	q_0, q_1, q_2
q_0, q_1, q_2 — E	q_0, q_2, q_3	q_0, q_1, q_2, q_3
q_0, q_3 — F	q_0	q_0, q_1
q_0, q_2, q_3 — G	q_0, q_3	q_0, q_1, q_3
q_0, q_1, q_2, q_1, q_3 — H	q_0, q_2, q_3	q_0, q_1, q_2, q_3



3. All binary numbers that can be divided by 3 — DFA

Problem 2.3 DFA	0	1
q_0 — A	q_0	q_1
q_1 — B	q_0	q_2
q_2 — C	q_1	q_2