

Homework 2: Regular languages

Katie Prescott, 2/22/16

I pledge my honor that I have
abided by the Stevens Honor System.

Katie Prescott

Let $M = (Q, \Sigma, \delta, q_1, F)$ where

$Q := \{q_1, q_2, q_3, q_4\}$

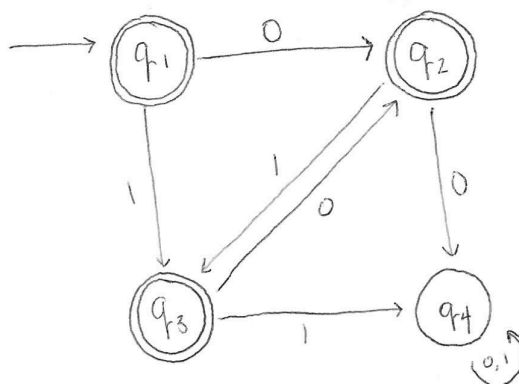
$\Sigma := \{0, 1\}$

$\delta :=$

	0	1
q_1	q_2	q_3
q_2	q_4	q_3
q_3	q_2	q_4
q_4	q_4	q_4

$F := \{q_1, q_2, q_3\}$

1) Draw the equivalent DFA



2) State whether each string belongs to the language

a. ~~0000~~ 0110... F

e. 1... T

b. 10101... T

f. 101... T

c. 01010... T

g. 1011... F

d. 0... T

h. ϵ ... T

3) Describe the language accepted by M

All strings, such that each 1 is followed by
a 0 and each 0 is followed by a 1,
until the end of the string.

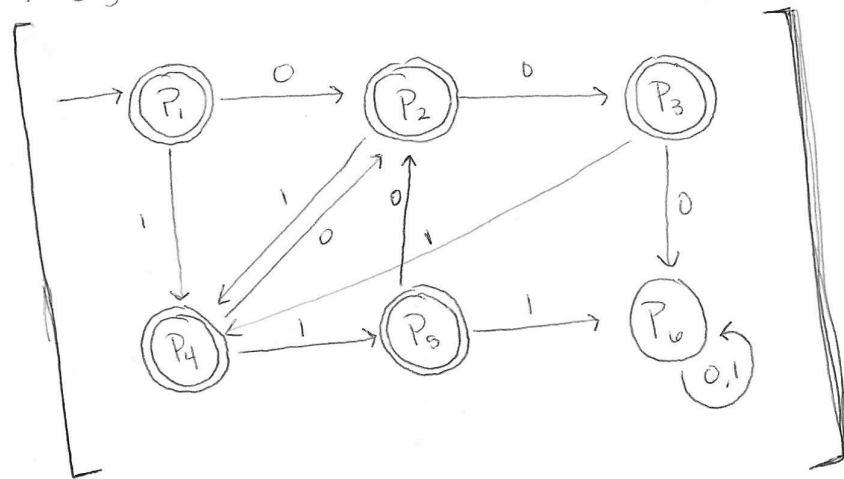
Let $N = (P, \Sigma, \gamma, P_i, G)$ where

$P := \{P_1, P_2, P_3, P_4, P_5, P_6\}$

$\Sigma = \{0, 1\}$

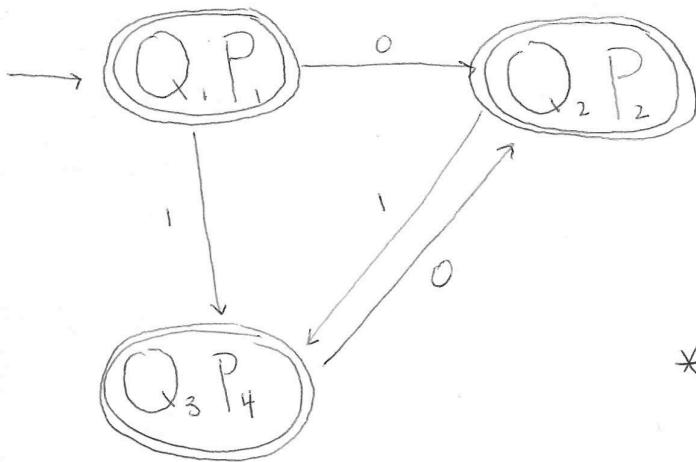
$\gamma :=$

	0	1
P_1	P_2	P_4
P_2	P_3	P_4
P_3	P_6	P_4
P_4	P_2	P_5
P_5	P_2	P_6
P_6	P_6	P_6



$G := \{P_1, P_2, P_3, P_4, P_5\}$

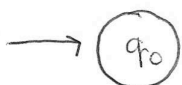
1) Draw NFA for $L(M) \cap L(N)$ and Describe the language.



Language:

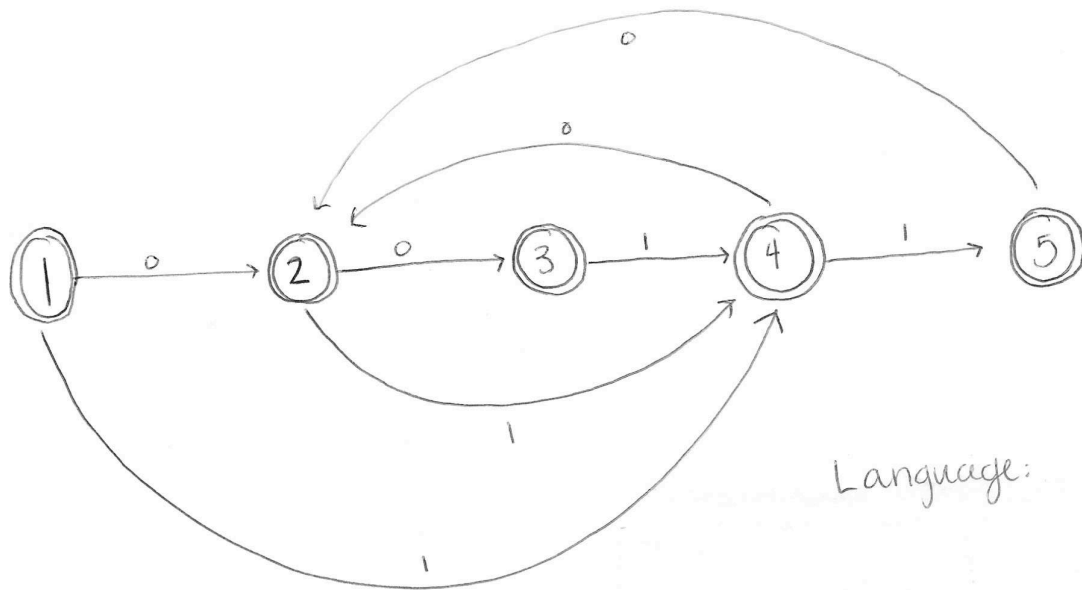
* You can't have more than 1 zero or one in a row in a string.

2) Draw NFA for $L(M) \setminus L(N)$ and Describe the language.



No string is accepted, because every string in $L(M)$ is also in $L(N)$.

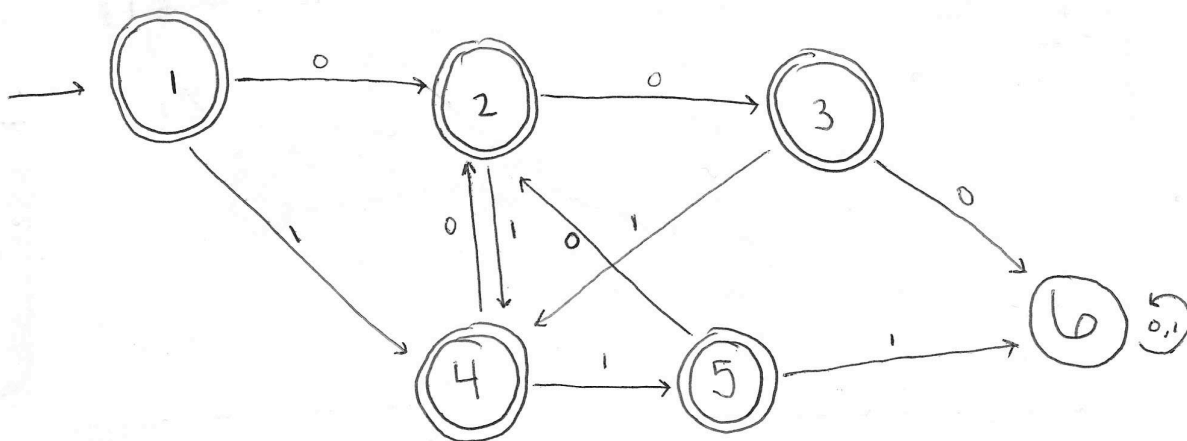
3) Draw NFA for $L(M) \cup L(N)$ & Describe the language



Language:

All strings, such that there is no more than 2 ones or 2 zeros in a row.

4) Convert above NFA to DFA.

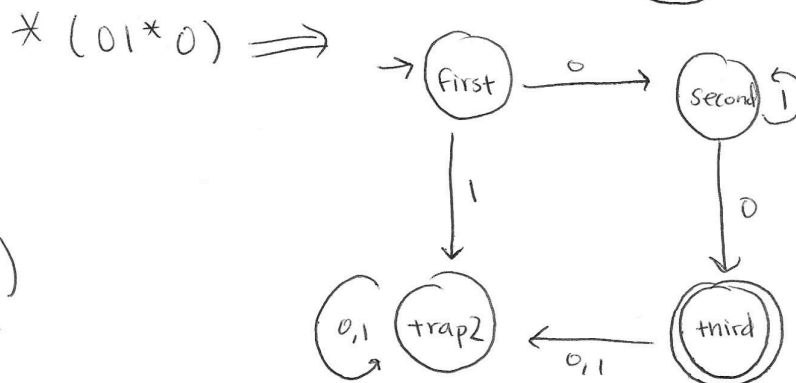
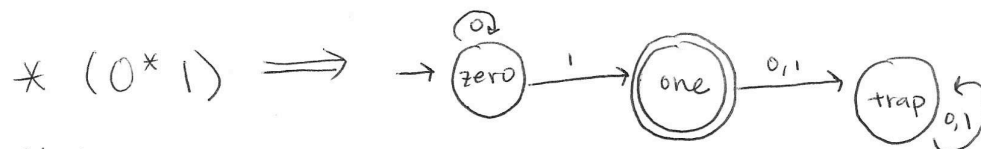


5) Provide the Regular Expression for $L(M) \cup L(N)$

$$[0 \cdot [(110)^* \cup (11)] \cup 1 \cdot [(011)^* \cup (01)] \cup [(00 \cup 11) \cdot (01)^* \cup (1100) \cdot (10)^*]$$

Given the alphabet $\{0, 1\}$, Provide the DFA for

$(0^*1) \cup (01^*0)$



$(0^*1) \cup (01^*0)$

