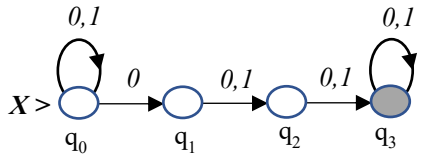
CS 302-HOMEWORK 1

(due October18 ,2022 before recitation)

Question 1:



*Consider the NFA **X** given above and let **L** be the language accepted by **X**. Compute a finite state automaton **Y**, DFA or NFA that accepts the language $\mathbf{L}^c$ (complement of **L**).*

Questions from the main text:

2.2.5, 2.2.6 (b)

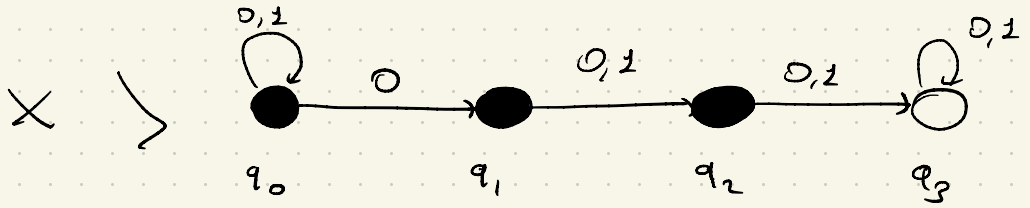
2.3.3, 2.3.4 (b) and (c)

2.5.2

HOMEWORK I ANSWERS

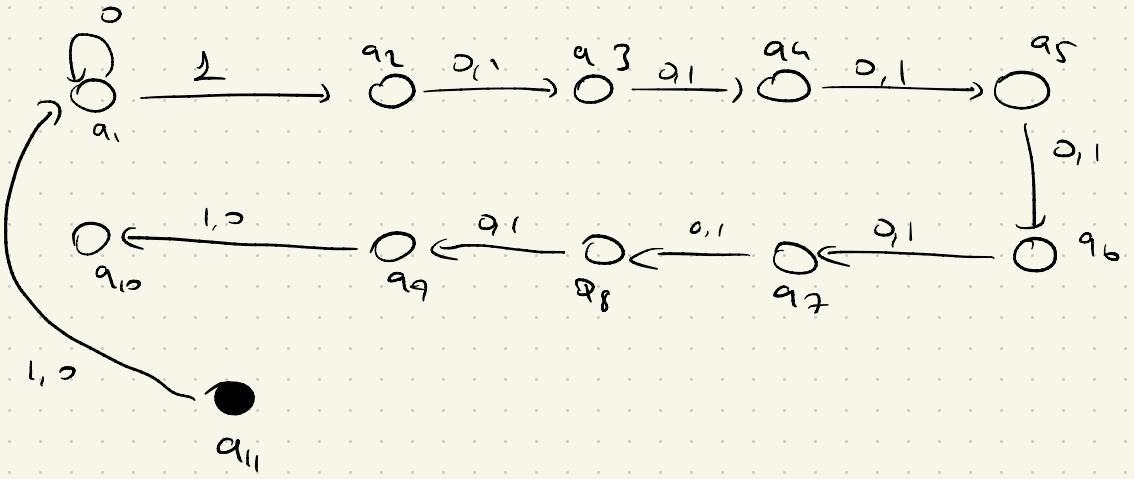
Q1 To make its complement, we should fill the first three states The final state should be empty.

It should look like this:



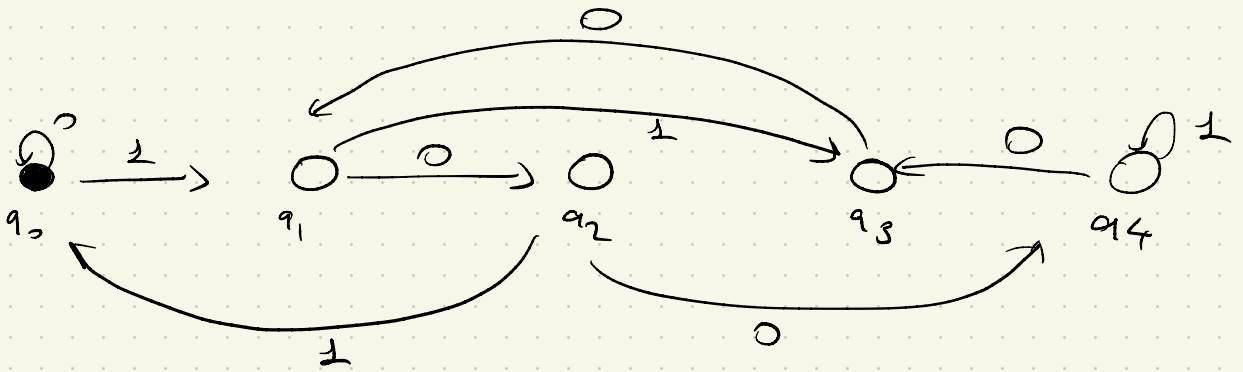
Q 2.2.5

b)



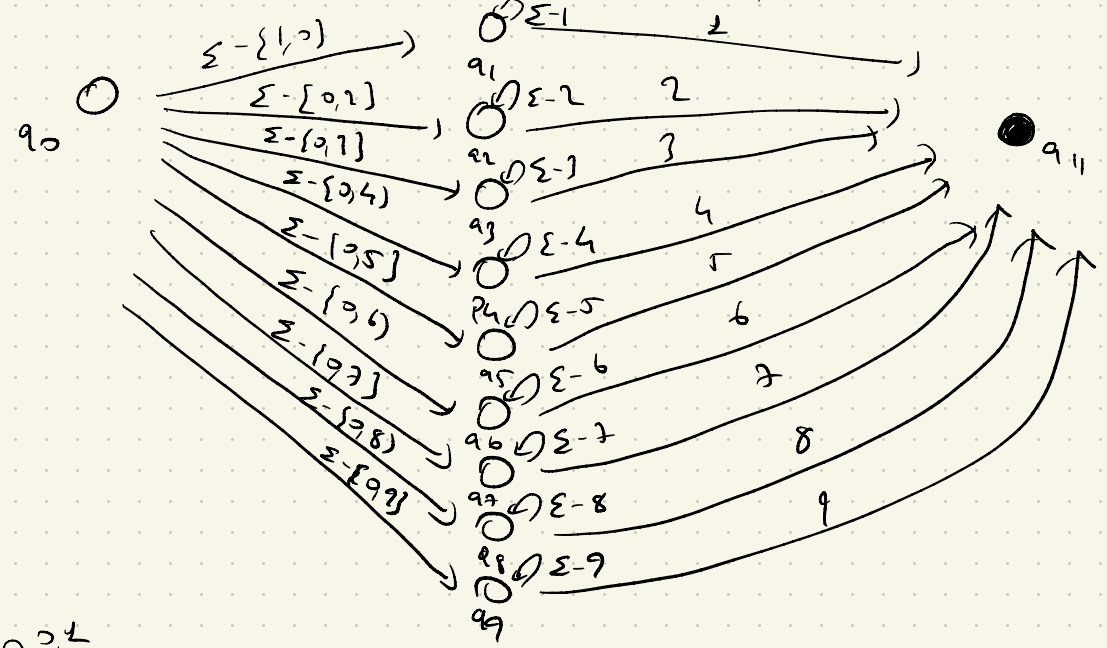
Q 2.2.6

b) x ⟩

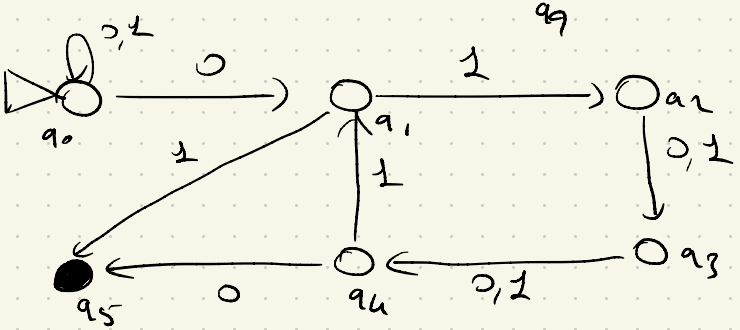


Q 2.3.4

b)


q0
q1
q2
q3
q4
q5
q6
q7
q8
q9
q10
q11
Σ - {1,2}
Σ - [0,2]
Σ - [0,3]
Σ - [0,4]
Σ - [0,5]
Σ - [0,6]
Σ - [0,7]
Σ - [0,8]
Σ - [0,9]
Σ-1
Σ-2
Σ-3
Σ-4
Σ-5
Σ-6
Σ-7
Σ-8
Σ-9
1
2
3
4
5
6
7
8
9

c)


q0
q1
q2
q3
q4
q5
0,1
0
1
1
1
0,1
0
0,1

Q2.5.2

	ε	a	b	c
$\rightarrow p$	$\{q, r\}$	$\emptyset$	$\{q\}$	$\{r\}$
q	$\emptyset$	$\{r\}$	$\{r\}$	$\{p, q\}$
$*r$	$\emptyset$	$\emptyset$	$\emptyset$	$\emptyset$

a) $p \rightarrow \{p, q, r\}$

$q \rightarrow \{q\}$

$r \rightarrow \{r\}$

b) ε, a, b, c, ba, bb, bc, ca, cb, cc, aca, acb, aac, abq, abb, baa, bab, bac, bca, bcb, bcc, caa, cab, cac, cba, cbb, cbc, cca, ccb, ccc

c)

	a	b	c
$\rightarrow *\{p, q, r\}$	$\{p, q, r\}$	$\{q, r\}$	$\{p, q, r\}$
$*\{q, r\}$	$\{p, q, r\}$	$\{r\}$	$\{p, q, r\}$
$*\{r\}$	$\emptyset$	$\emptyset$	$\emptyset$
$\emptyset$	$\emptyset$	$\emptyset$	$\emptyset$