

November 2021
الیک دسمبر، ۲۰۲۱

29
MONDAY

M	T	W	T	F	S	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

Theory Of Automata

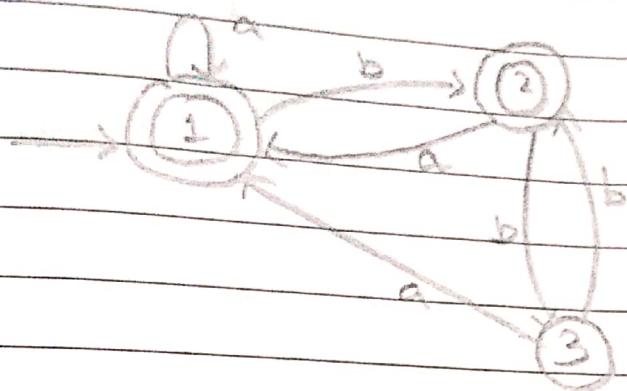
Assignment #2.

Name: Ishaqullah Siddiqui

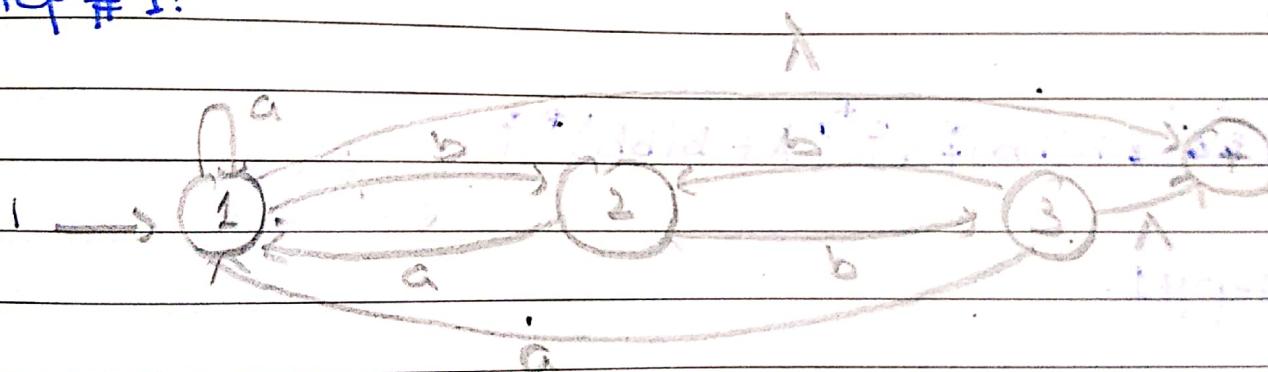
Section: 4E

ID: 20K-0148.

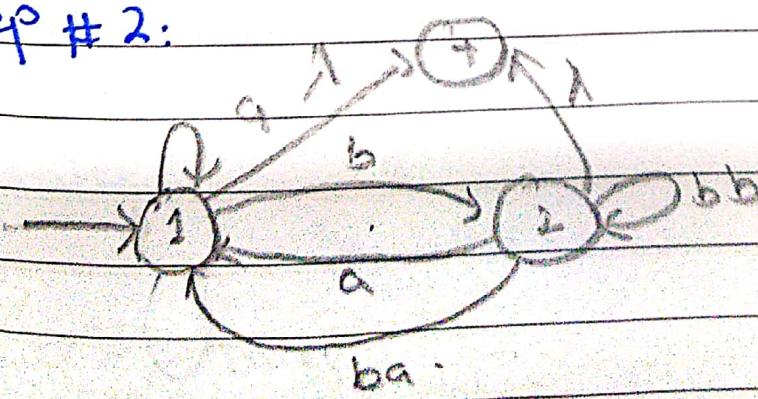
Q1



Step # 1:



Step # 2:



APPOINTMENT

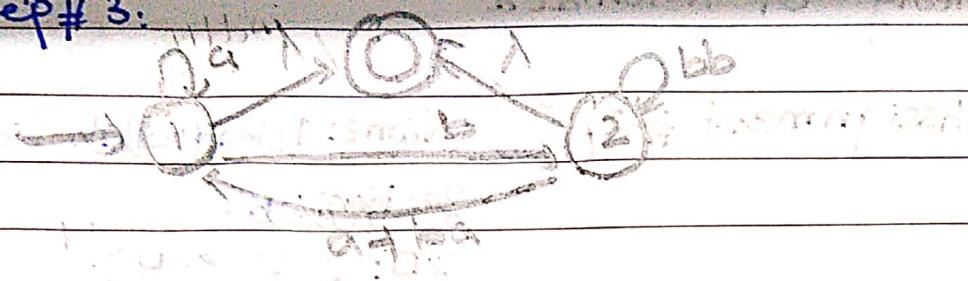
November 2021

30
TUESDAY

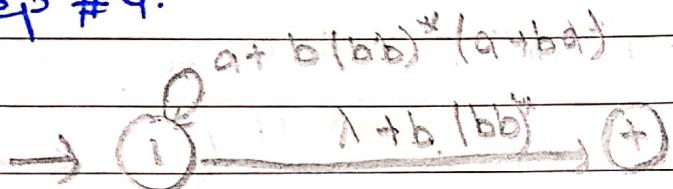
٢٥ ربیع الثانی ١٤٣٣

NOVEMBER 2021						
M	T	W	T	F	S	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

Step # 3:



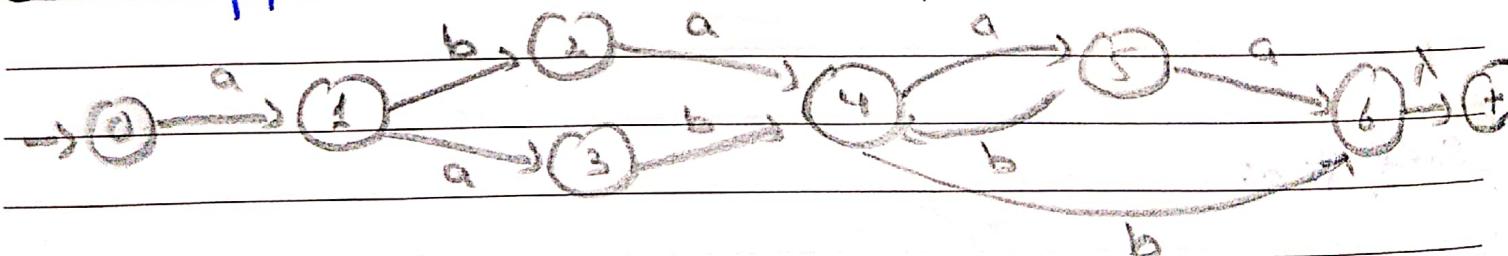
Step # 4:



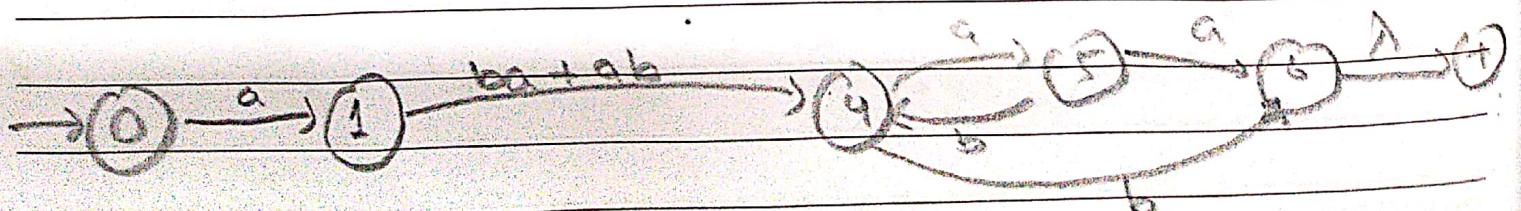
Step # 5:

$$RE \{ (a+b(bb)* + b(bb)* + a)^* (a+b(bb)*) \}$$

O2 Step #1.



Step # 2.



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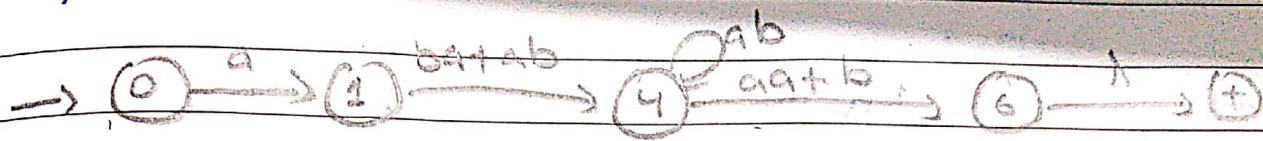
01

WEDNESDAY

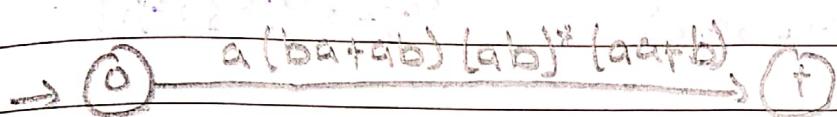
٢٦ ربیع الثاني ١٤٣٣ھ

DECEMBER 2021						
M	T	W	T	F	S	S
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

Step # 3



Step # 4

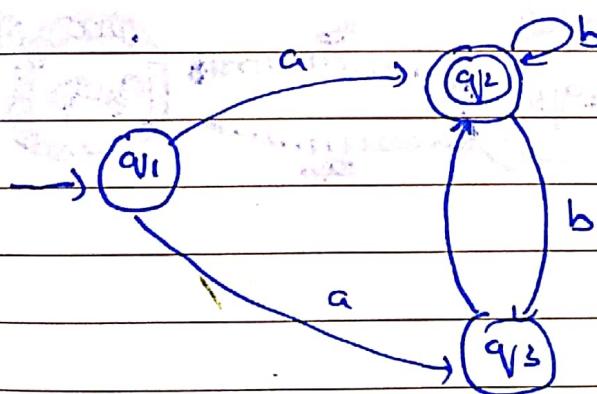


Step # 5

RE

$$a(ba+ab)(ab)^*(aab+b)$$

(Q3)



Transition table

States.	a	b
-q11	{q11, q12, q13}	\emptyset
+q12	{q11, q12, q13}	{q12, q13, q11}
q13	{q11, q12}	\emptyset

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December 2021

٢٧ ربیع الثانی ١٤٣٣

02
THURSDAY

DECEMBER 2021						
M	T	W	T	F	S	S
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

TT for DFA

States.

$\{-q_1\}$

a

$\{q_1, q_2, q_3\}$

b

\emptyset

$\{q_1, q_2, q_3\}$.

$\{q_1, q_2, q_3\}$

$\{q_2, q_3\}, q_1\}$

\emptyset

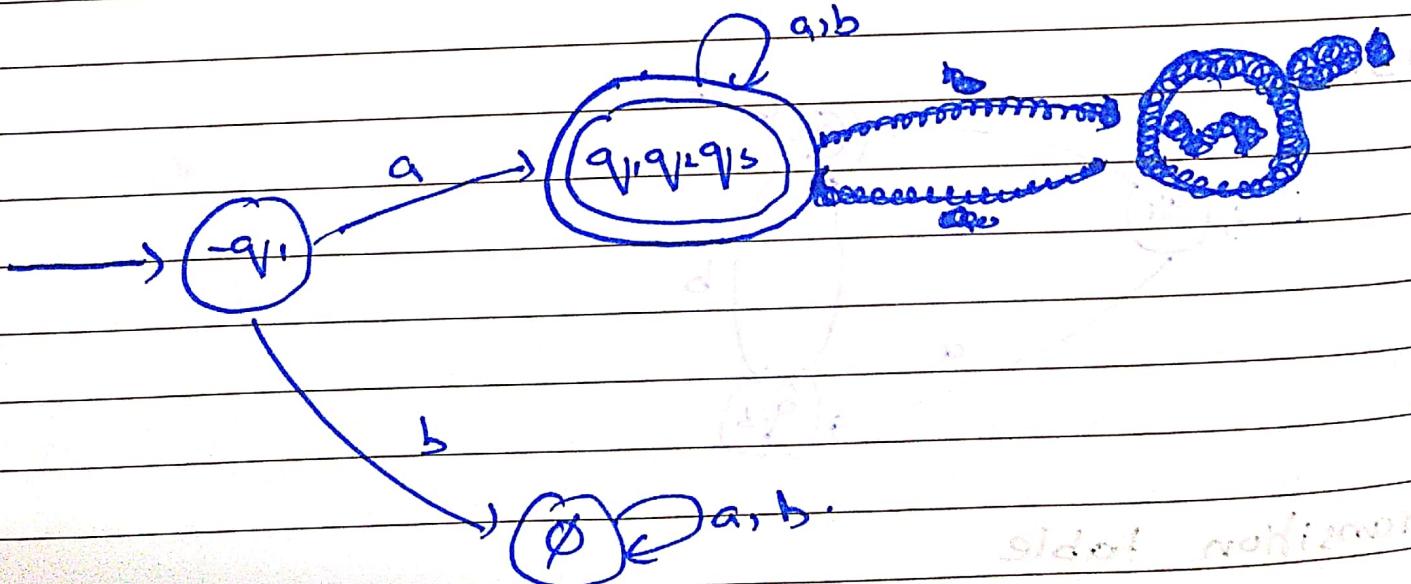
\emptyset

\emptyset

$\{q_1, q_2, q_3\}$

$\{q_1, q_2, q_3\}$

$\{q_1, q_2, q_3\}$



December 2021

06

MONDAY

٢٠ جمادى الاول ١٤٣٣

DECEMBER 2021						
M	T	W	T	F	S	S
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

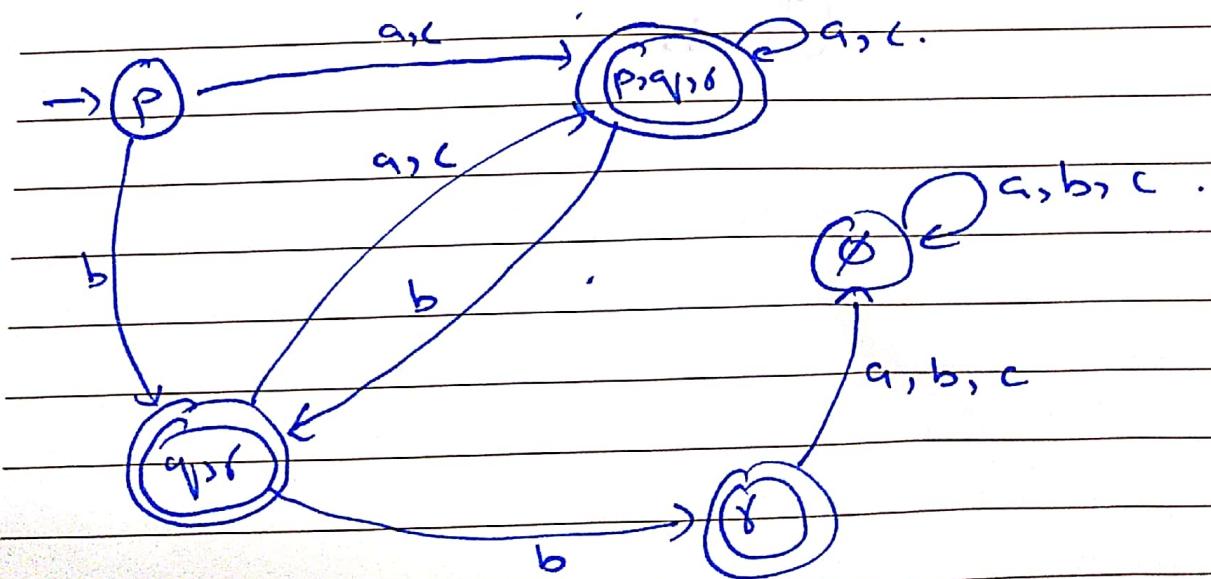
Q4

Transition table for E-NFA.

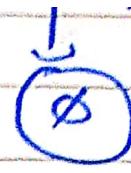
States	a	b	c
p	p, q ₁ , r	q ₁ , r	p, q ₁ , r
q ₁	p, q ₁ , r	p, r	p, q ₁ , r
r	∅	∅	∅

Transition table for DFA.

States	a	b	c
p	p, q ₁ , r	q ₁ , r	p, q ₁ , r
p, q ₁ , r	p, q ₁ , r	q ₁ , r	p, q ₁ , r
q ₁ , r	p, q ₁ , r	r	p, q ₁ , r
r	∅	∅	∅
∅	∅	∅	∅



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Q5.

Transition table for ϵ -NFA.

States.	a	b
q_0	$\{q_1, q_2\}$	\emptyset
q_1	$\{q_1, q_2\}$	\emptyset
q_2	\emptyset	$\{q_1, q_3\}$
q_3	$\{q_1, q_2\}$	\emptyset

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Transition table for DFA.

States

$\{q_0\}$

a

b

$\{q_1, q_2\}$

$\{q_1, q_2\}$

\emptyset

\emptyset

\emptyset

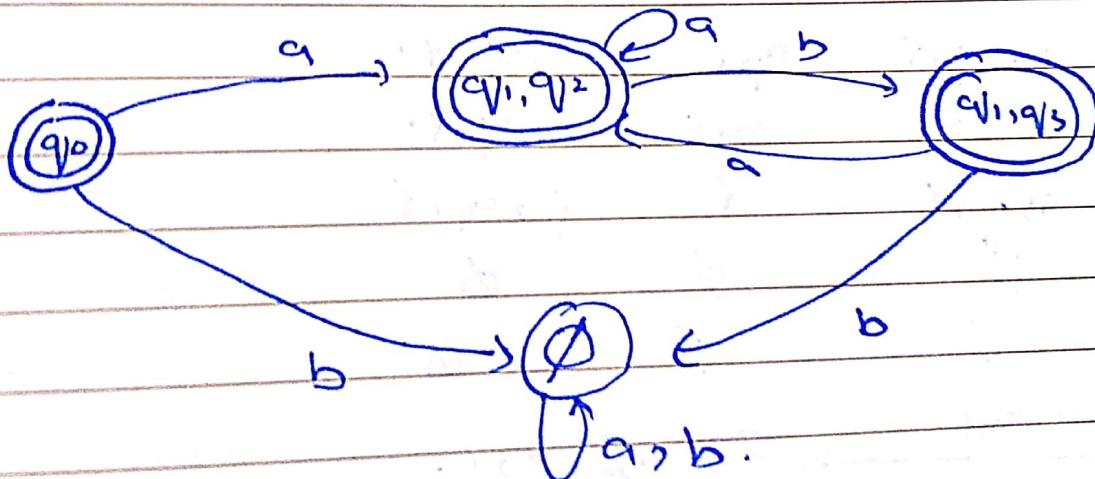
\emptyset

\emptyset

\emptyset

$\{q_1, q_2\}$

\emptyset



December 2021

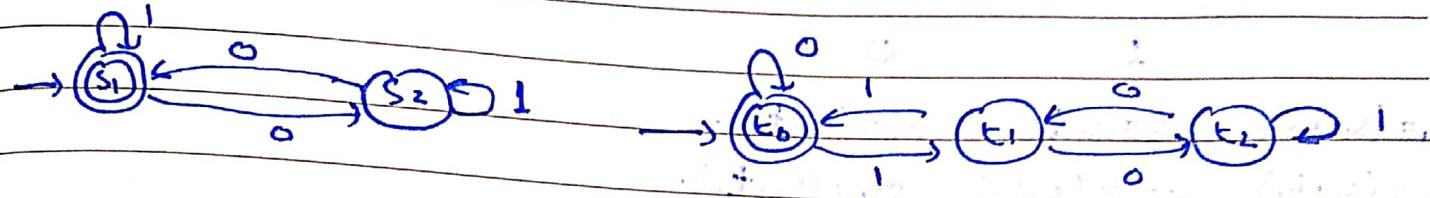
١٣٢٣ جمادى الاول

07
TUESDAY

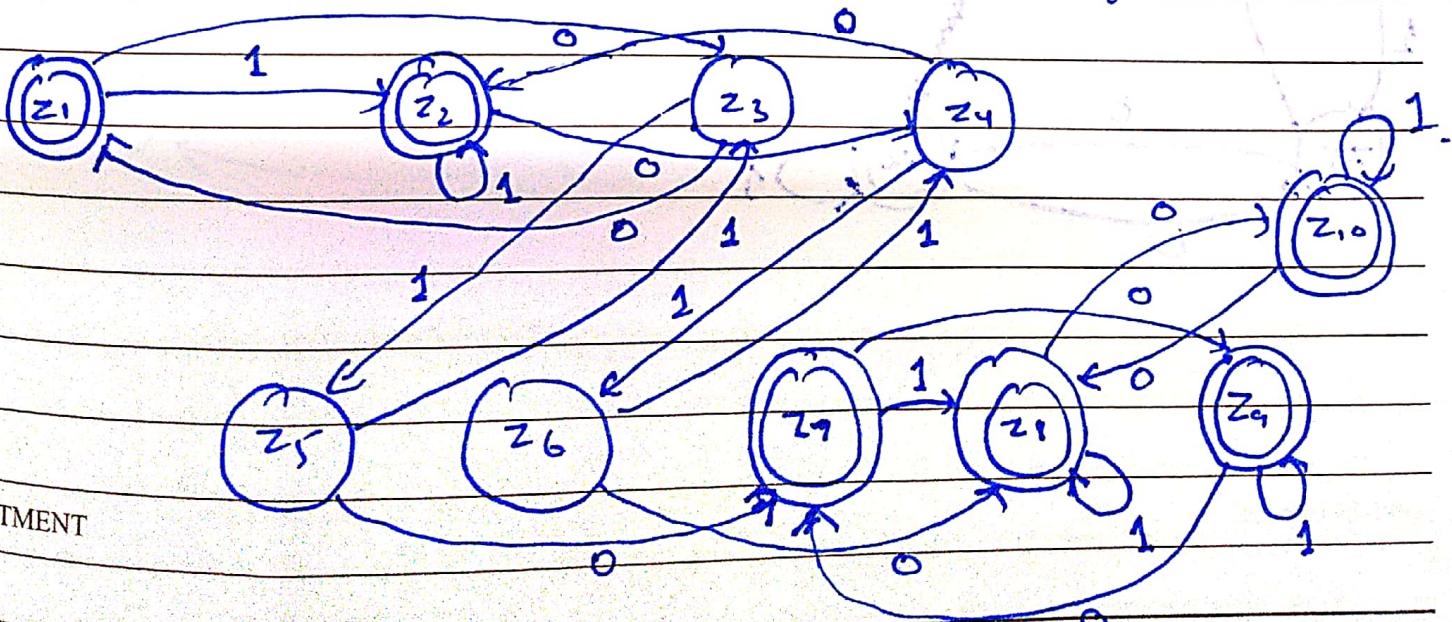
DECEMBER 2021						
M	T	W	T	F	S	S
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

(Q6.

(i) Concatenation



- $z_1 = (S_1 \rightarrow t_0)$
 $z_2 = (S_1 \rightarrow t_0, t_1)$
 $z_3 = (S_2 \rightarrow t_0)^+$
 $z_4 \neq (S_2 \rightarrow t_1)$
 $z_5 = (S_2 \rightarrow t_0, t_1)^+$
 $z_6 = (S_2 \rightarrow t_0, t_1, t_2)$
 $z_7 = (S_1 \rightarrow t_0, t_2)^+$
 $z_8 = (S_1 \rightarrow t_0, t_1, t_2)$
 $z_9 \in (S_2 \rightarrow t_0, t_1)^+$
 $z_{10} \in (S_2 \rightarrow t_0, t_1, t_2)^+$
- $(S_1 \rightarrow t_0, t_1, t_2) \neq z_1$
 $(S_1 \rightarrow t_0, t_1) = z_2$
 $(S_2, t_0) = z_3$
 $(S_2, t_1) = z_4$
 $(S_2, t_0, t_1) = z_5$
 $(S_2, t_0, t_1, t_2) = z_6$
 $(S_1, t_0) = z_7$
 $(S_1, t_0, t_1) = z_8$
 $(S_1, t_0, t_1, t_2) = z_9$
 $(S_1, t_0, t_1, t_2) = z_{10}$



December 2021

08

WEDNESDAY

٢٠ جمادى الاول ١٤٣٣ هـ

M	T	W	T	F	S	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

2 Union.

1

0

$$+ z_1 = (s_1, t_0) \quad z_2 = (s_1, t_1) \quad z_3 = (s_2, t_0).$$

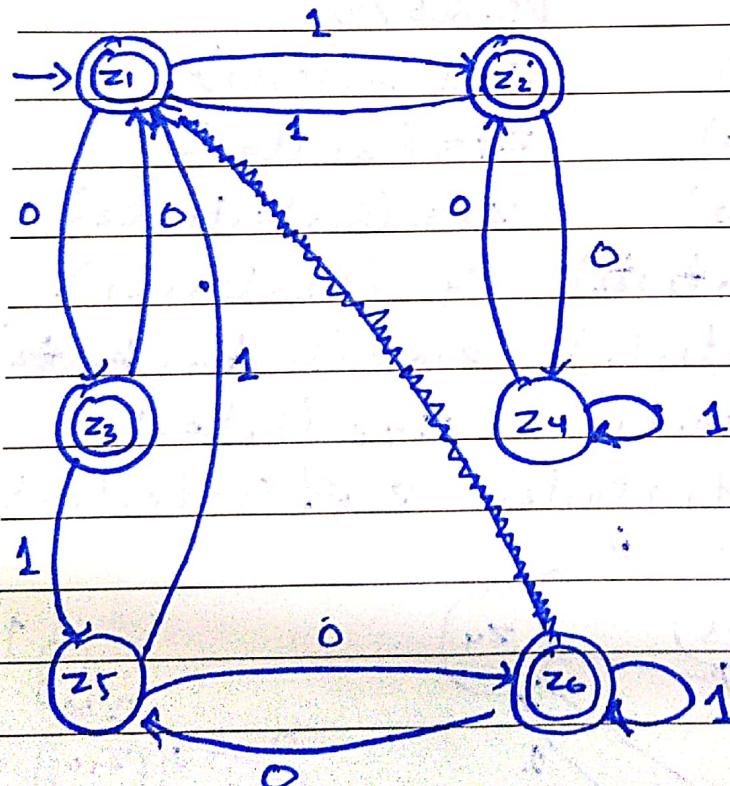
$$+ z_2 = (s_1, t_1) \quad z_1 = (s_1, t_0) \quad z_4 = (s_2, t_2).$$

$$+ z_3 = (s_2, t_0) \quad z_5 = (s_2, t_1) \quad z_1 = (s_1, t_0).$$

$$z_4 = (s_2, t_2) \quad z_1 = (s_2, t_2) \quad z_2 = (s_2, t_1)$$

$$z_5 = (s_2, t_1) \quad z_1 = (s_1, t_0) \quad z_6 = (s_1, t_2).$$

$$+ z_6 = (s_1, t_2) \quad z_3 = (s_1, t_2) \quad z_5 = (s_2, t_1).$$



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09

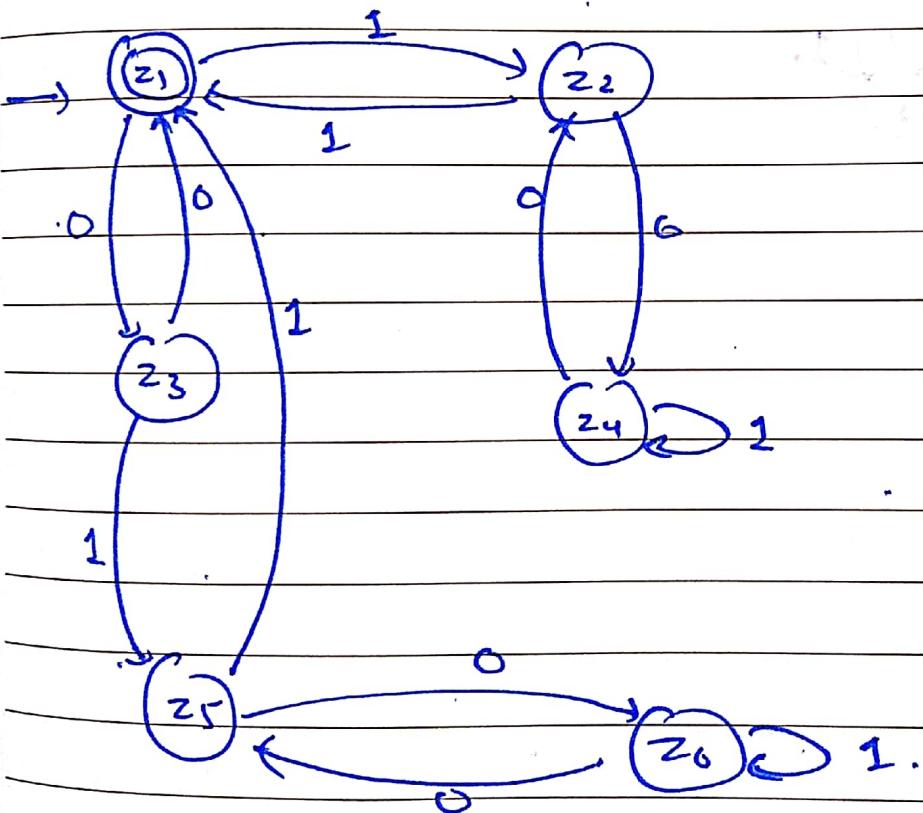
THURSDAY

• جمادى الاول ١٤٣٢

DECEMBER 2021						
M	T	W	T	F	S	S
			1	2	3	4
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

3. Intersection:

$$\begin{array}{lll}
 z_1 = (s_1, t_0) & z_2 = (s_1, t_1) & z_3 = (s_2, t_0) \\
 z_2 = (s_1, t_1) & z_1 = (s_1, t_0) & z_4 = (s_2, t_2) \\
 z_3 = (s_2, t_0) & z_5 = (s_2, t_1) & z_1 = (s_1, t_0) \\
 z_4 = (s_2, t_2) & z_4 = (s_2, t_2) & z_2 = (s_1, t_1) \\
 z_5 = (s_2, t_1) & z_1 = (s_1, t_0) & z_6 = (s_1, t_2) \\
 z_6 = (s_1, t_2) & z_6 = (s_1, t_2) & z_5 = (s_2, t_1)
 \end{array}$$



APPOINTMENT

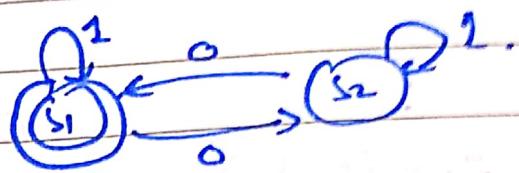
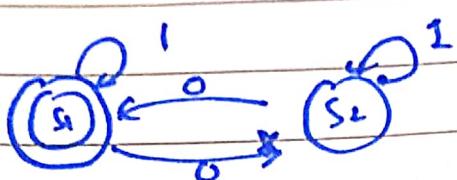
December 2021

٢٠ جمادى الاول ١٤٤٣

FRIDAY

13	14	15	16	17
20	21	22	23	24
27	28	29	30	31

4. Closure.



$$\dagger z_1 \in S_1$$

$$z_1 \in S_1$$

$$z_2 \in S_2.$$

$$z_2 \in S_2$$

$$z_2 \in S_2$$

$$z_1 \in S_1.$$

