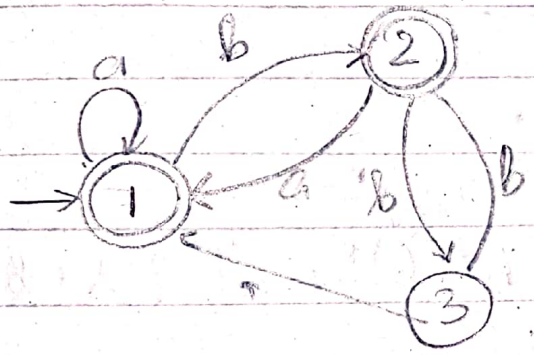
THEORY OF AUTOMATA

ASSIGNMENT 02

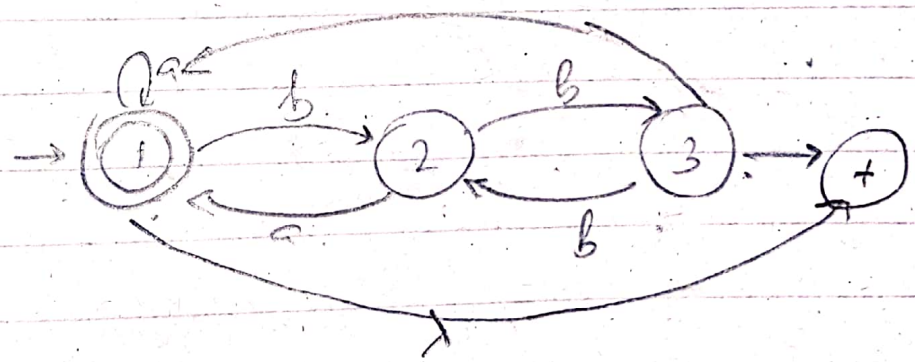
Name: Bilal Ahmed Khan

ROLL NO: 20K-0183 Section: B

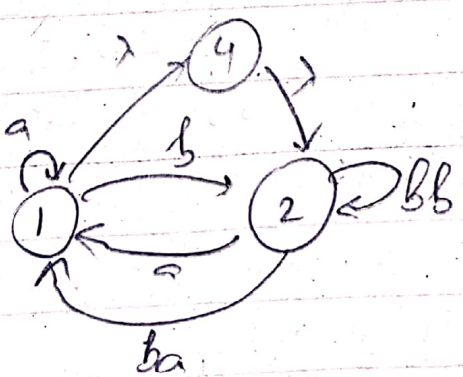
QUESTION NO.01



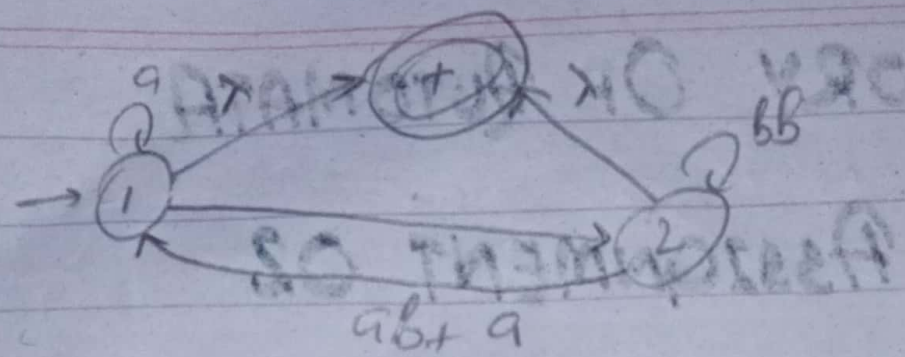
01)



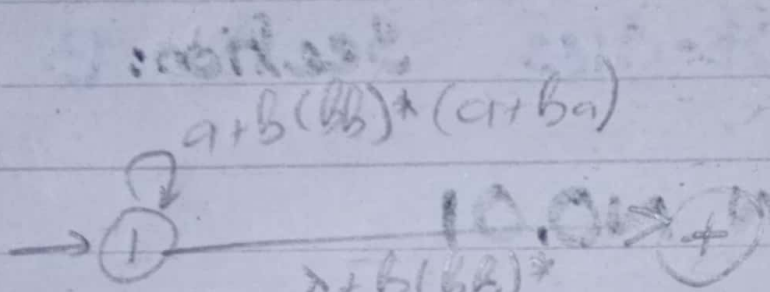
02)



03)



04)

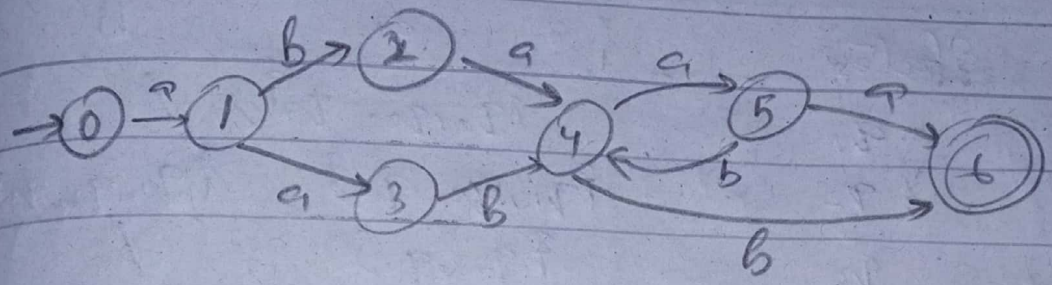


05)

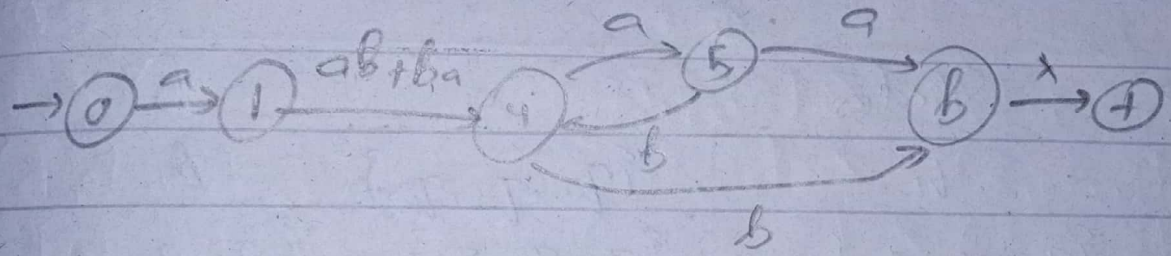
RE:

$$[(a+ba)b(bb)^* + a]^* \{\lambda + b(bb)^*\}$$

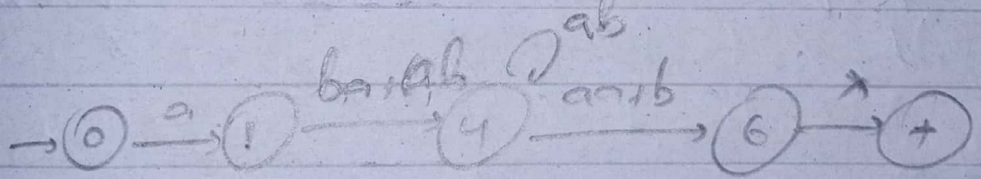
QUESTION NO.02



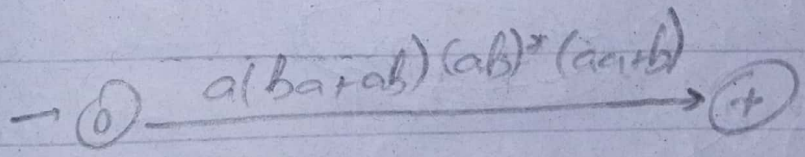
01)



02)



03)

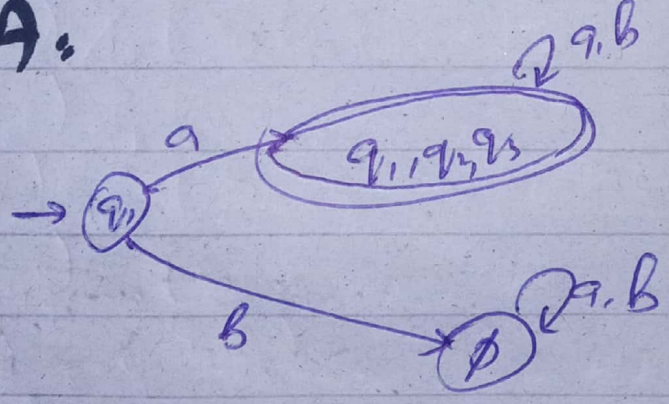


QUESTION 03

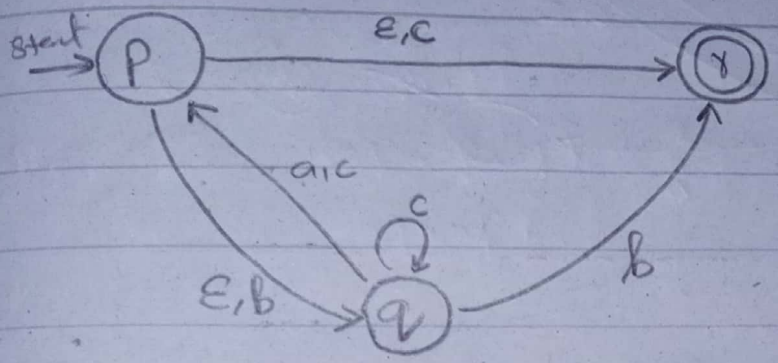
States	a	b
q_1	$\{q_1, q_2, q_3\}$	ϕ
q_2	$\{q_1, q_2, q_3\}$	$\{q_1, q_2, q_3\}$
q_3	$\{q_1, q_2\}$	ϕ

States	a	b
q_1	$\{q_1, q_2, q_3\}$	ϕ
$\{q_1, q_2, q_3\}$	$\{q_1, q_2, q_3\}$	$\{q_1, q_2, q_3\}$
ϕ	ϕ	ϕ

DFA:



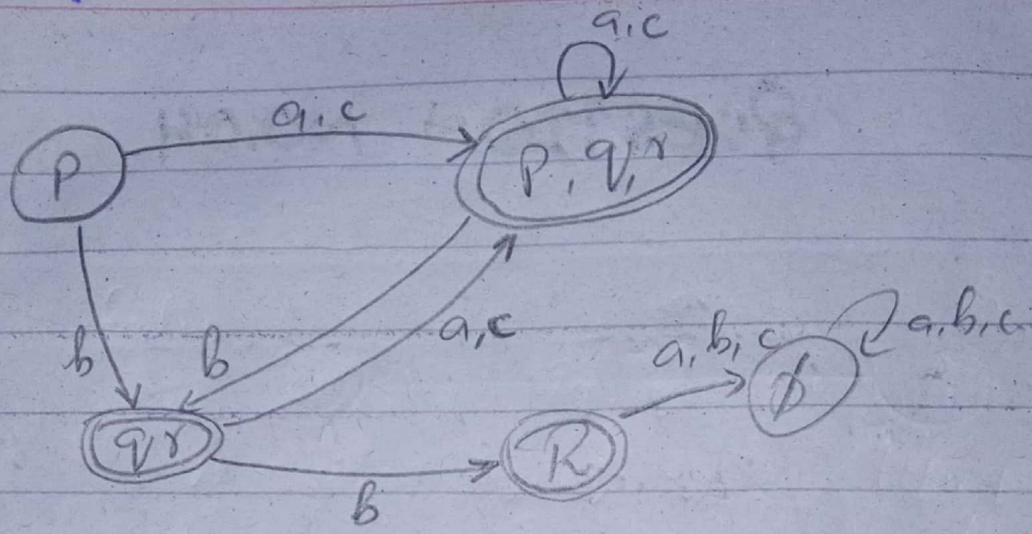
QUESTION NO.04



State	a	b	c
p	{p,q,r}	{q,r}	{p,q,r}
q	{p,q,r}	r	{p,q,r}
r	∅	∅	∅

States	a	b	c
p	{p,q,r}	{q,r}	{p,q,r}
{p,q,r}	{p,q,r}	{q,r}	{p,q,r}
{q,r}	{p,q,r}	r	{p,q,r}
r	∅	∅	∅
∅	∅	∅	∅

DFA:

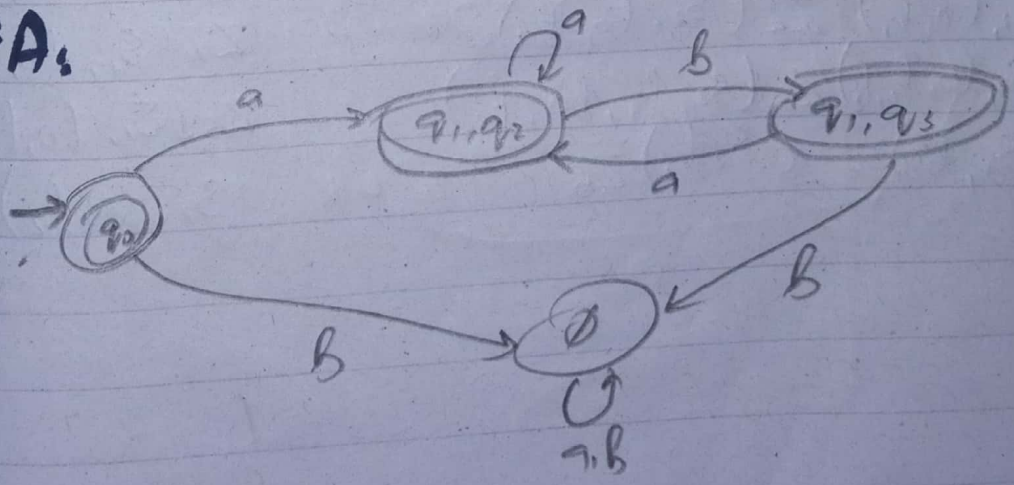


QUESTION 05

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

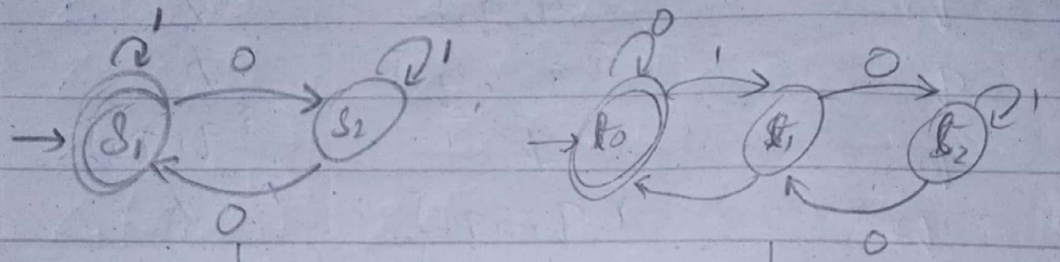
States	a	b
q_0	$\{q_1, q_2\}$	ϕ
$\{q_1, q_2\}$	$\{q_1, q_2\}$	$\{q_1, q_3\}$
ϕ	ϕ	ϕ
$\{q_1, q_3\}$	$\{q_1, q_2\}$	ϕ

DFA:

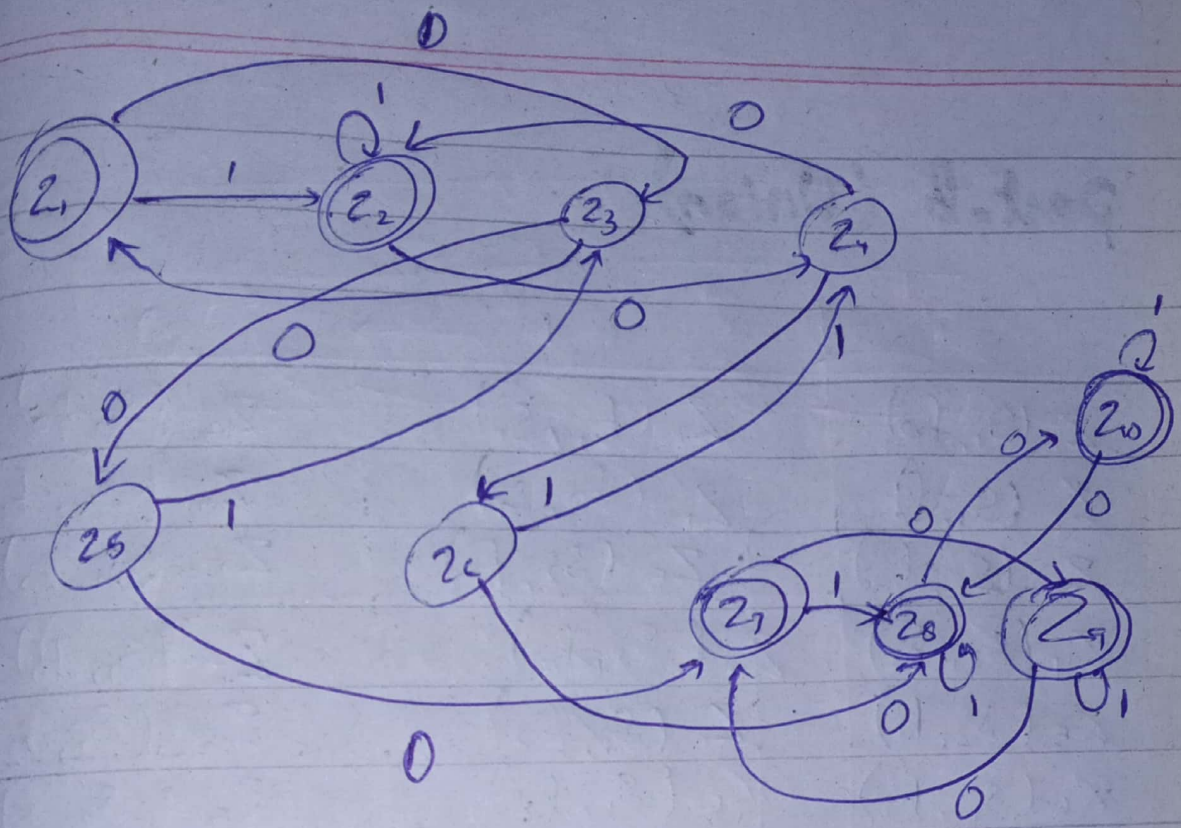


QUESTION 06

Part-a (Concatenation)



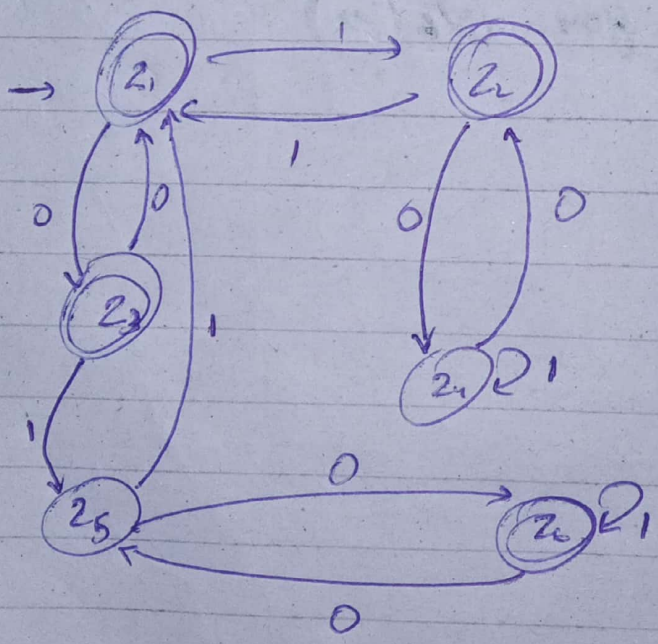
	1	0
$Z_1 (S_1, f_0)$	$Z_2 (S_1, f_1, f_0)$	$(S_2, f_0) = Z_3$
$Z_2 (S_1, f_0, f_1)$	$Z_2 (S_1, f_0, f_1)$	$Z_4 (S_2, f_0, f_2)$
$Z_4 (S_2, f_0, f_2)$	$Z_6 (S_2, f_1, f_2)$	$Z_2 (S_1, f_0, f_1)$
$Z_5 (S_2, f_1)$	$Z_3 (S_2, f_0)$	$Z_7 = (S_1, f_0, f_2)$
$Z_6 (S_2, f_2, f_1)$	$Z_4 (S_2, f_0, f_2)$	$Z_8 = (S_1, f_0, f_1, f_2)$
$Z_7 (S_1, f_0, f_2)$	$Z_8 (S_1, f_0, f_1, f_2)$	$Z_6 (S_2, f_0, f_1)$
$Z_8 (S_1, f_0, f_1, f_2)$	$Z_8 (S_1, f_0, f_1, f_2)$	$Z_{10} (S_2, f_0, f_1, f_2)$
$Z_9 (S_2, f_0, f_1)$	$Z_6 (S_2, f_0, f_1)$	$Z_7 (S_1, f_0, f_2)$
$Z_{10} (S_2, f_0, f_1, f_2)$	$Z_{10} (S_2, f_1, f_0, f_2)$	$Z_8 (S_1, f_0, f_2, f_1)$
$Z_3 (S_2, f_0)$	$(S_2 f_1) Z_5$	$(S_2, f_0, f_2) Z_1$



DFA for Q.1(a)

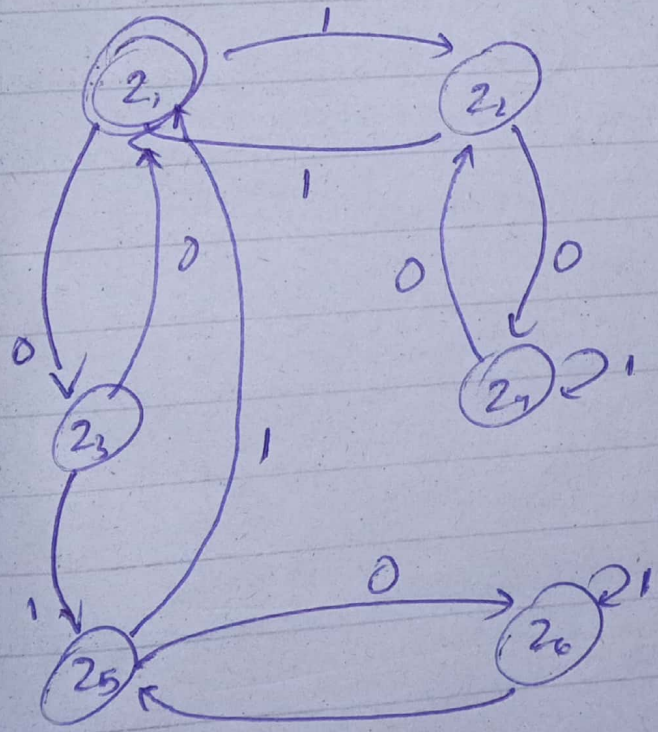
Part-B (Union)

	1	0
$Z_1 (S_1, f_0)$	$Z_2 (f_1, S_1)$	$Z_3 (S_2, f_0)$
$Z_2 (S_1, f_1)$	$Z_1 (f_0, S_1)$	$Z_4 (S_2, f_1)$
$Z_3 (S_2, f_0)$	$Z_5 (S_2, f_1)$	$Z_1 = (S_1, f_0)$
$Z_4 (S_2, f_2)$	$Z_4 (S_2, f_2)$	$Z_2 (S_1, f_1)$
$Z_5 (S_2, f_1)$	$Z_1 (S_1, f_0)$	$Z_6 (S_1, f_2)$
$Z_6 (S_1, f_2)$	$Z_6 (S_1, f_2)$	$Z_5 (S_2, f_1)$

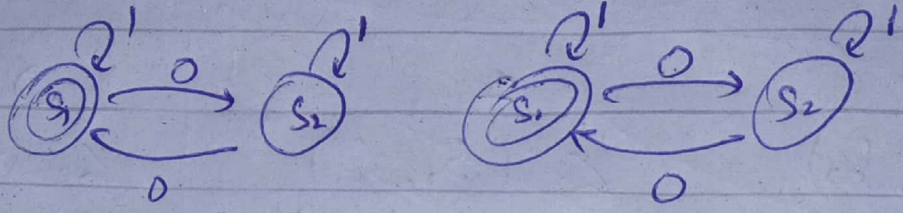


part_c (Intersection)

	1	0
Z_1 (S_1, f_0)	Z_2 (S_1, f_1)	Z_3 (S_2, f_0)
Z_2 (S_1, f_1)	Z_1 (S_1, f_0)	Z_4 (S_2, f_2)
Z_3 (S_2, f_0)	Z_5 (S_2, f_1)	Z_1 (S_1, f_0)
Z_4 (S_2, f_2)	Z_4 (S_2, f_2)	Z_2 (S_1, f_1)
Z_5 (S_2, f_1)	Z_1 (S_1, f_0)	Z_6 (S_1, f_2)
Z_6 (S_1, f_2)	Z_6 (S_1, f_2)	Z_5 (S_2, f_1)



part-d (closure)



	1	0
$Z_1 (S_1)$ $Z_2 (S_2)$	$Z_1 (S_1)$ $Z_2 (S_2)$	$Z_2 (S_2)$ $Z_1 (S_1)$