Assignment 5

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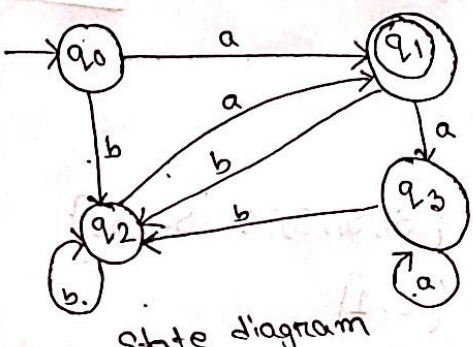
Question 1

i) $m = \{\{q_0, q_1, q_2, q_3\}, \{a, b\}, q_0, f(s), \{q_1\}\}$

f_s	a	b
q_0	q_1	q_2
q_1	q_3	q_2
q_2	q_1	q_2
q_3	q_3	q_2

state transition table



State diagram

ii) As long as the DFA finds a match, it transitions to the next expected state, when it does not it goes to dead state. The email password enter will be reported incorrect. And if it continues its transition and goes to final state we can conclude the password is correct. If does not reach final state it is incorrect

Question 2

i) $m = \{S, I, q_0, f_s, F\} \Rightarrow m = \{\{S_0, S_1, S_2, S_3, S_4\}, \{a, b\}, q_0, f(s), \{S_2, S_3\}\}$

f_s	a	b
S_0	S_2	S_1
S_1	S_3	S_1
S_2	S_4	S_3
S_3	S_3	S_3
S_4	S_2	S_3

state transition table

$f_s(S_0, a) = S_2$
$f_s(S_1, a) = S_3$
$f_s(S_2, a) = S_4$
$f_s(S_3, a) = S_3$
$f_s(S_4, a) = S_2$
$f_s(S_0, b) = S_1$
$f_s(S_1, b) = S_1$
$f_s(S_2, b) = S_3$
$f_s(S_3, b) = S_3$
$f_s(S_4, b) = S_3$

ii) a) $w = aaaaaa$

$S_0 \xrightarrow{a} S_2 \xrightarrow{a} S_4 \xrightarrow{a} S_2 \xrightarrow{a} S_4 \xrightarrow{a} S_2 \xrightarrow{a} S_4$

the last state is not reached so, not accepted by DFA.

b) w = ababab

$S_0 \xrightarrow{a} S_2 \xrightarrow{b} S_3 \xrightarrow{a} S_3 \xrightarrow{b} S_3 \xrightarrow{a} S_3 \xrightarrow{b} S_3$

F is reached, so, accepted by DFA

Question 3

i) a) $S = \{S_0, S_1, S_2, S_3, S_4, S_5\}$

$I = \{0, 1\}$

q_0 = initial state which is S_0

$F = \{S_0, S_1, S_5\}$

$M = \{S, I, q_0, f_s, F\}$

$M = \{\{S_0, S_1, S_2, S_3, S_4, S_5\}, \{0, 1\}, q_0, f_s, \{S_0, S_1, S_5\}\}$

b) w = 0011101100

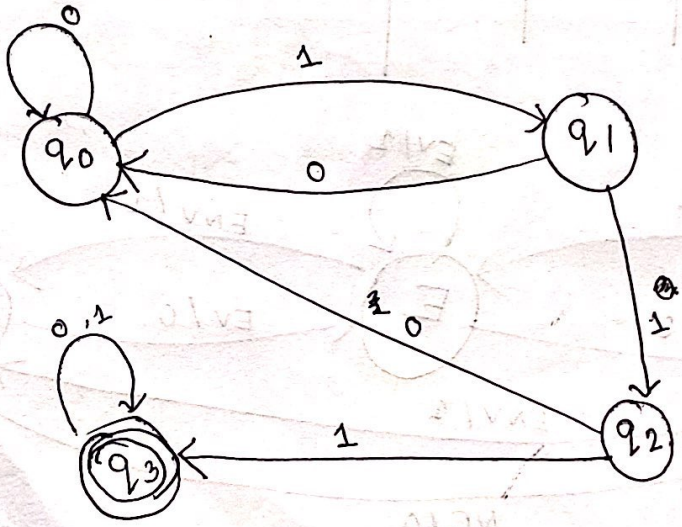
$S_0 \xrightarrow{0} S_0 \xrightarrow{0} S_0 \xrightarrow{1} S_1 \xrightarrow{1} S_2 \xrightarrow{1} S_3 \xrightarrow{0} S_5 \xrightarrow{1} S_5$

$\xrightarrow{1} S_5 \xrightarrow{0} S_4 \xrightarrow{0} S_4$

F not reached so, not accepted by DFA

ii) $M = \{S, I, q_0, f_s, F\}$

$M = \{\{q_0, q_1, q_2, q_3\}, \{0,1\}, q_0, f_s, \{q_3\}\}$



transition diagram

Question 4

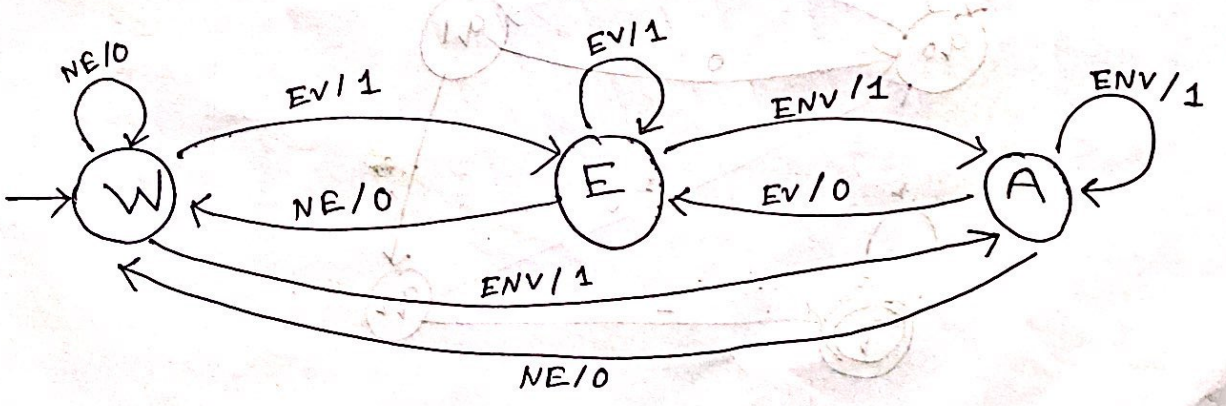
Input → not enemies = NE
enemies & not vulnerable = ENV
enemies & vulnerable = EV

Output → Shoot → S 1
not shoot → NS 0

States → WANDER = W
EVADE = E
ATTACK = A

elements of M
S = {W, E, A}
I = {NE, ENV, EV}
~~O = {S, NS}~~ ~~O = {S, NS}~~
W = initial state
O = {1, 0}

State	Input, f_s			Output, f_o		
	NE	ENV	EV	NE S	ENV ~~NS~~	EV
W	W	A	E	0 ~~1~~ ~~NS~~	1 S	1 S
E	W	A	E	0 ~~NS~~	1 S	1 S
A	W	~~ENA~~	E	0 ~~NS~~	1 S	1 S



finite state ~~transition~~ diagram

Question 5

Elements of M

$S = \{S_1, S_2, S_3, S_4, S_5, S_6, S_7, S_8, S_9\}$

$I = \{A, B, C, D, E, F, G, H, I\}$

$O = \{0, 1, 2\}$

S_1 = initial state

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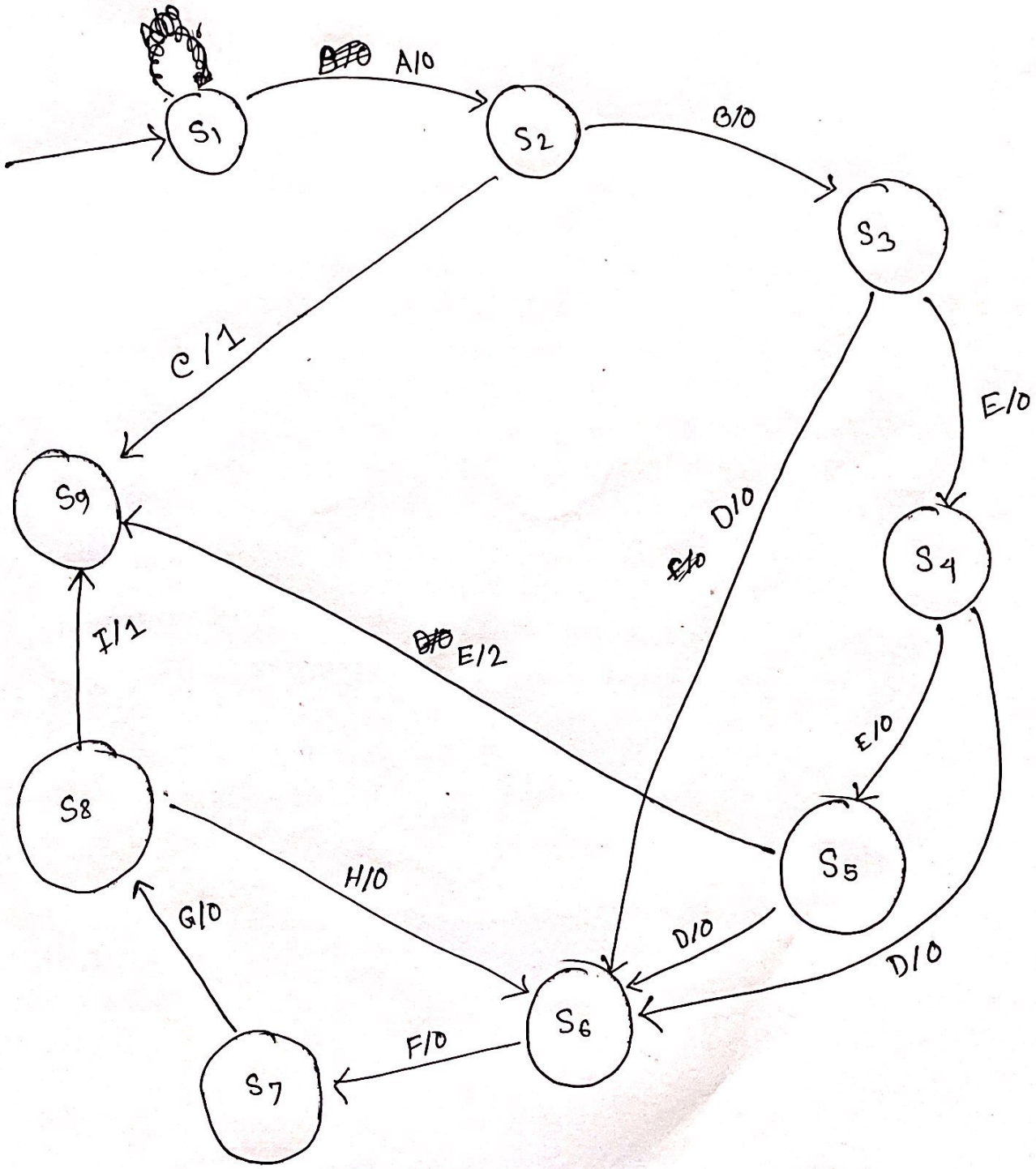

transition ~~State~~ diagram

~~Question 5~~ Table

State	Input, f_s									Output, f_o								
	A	B	C	D	E	F	G	H	I	A	B	C	D	E	F	G	H	I
S_1	S_2	S_3			S_4					0								
S_2		S_3	S_9							0	0	1						
S_3				S_6	S_4								0	0				
S_4				S_6	S_5								0	0				
S_5				S_6	S_7								0	2				
S_6						S_7									0			
S_7							S_8									0	1	
S_8								S_6	S_9								0	1
S_9																		