UTM

UNIVERSITI TEKNOLOGI MALAYSIA

SCHOOL OF COMPUTING

SESSION 2020/2021 SEMESTER 1

SECI 1013 -07

DISCRETE STRUCTURE

ASSIGNMENT 5

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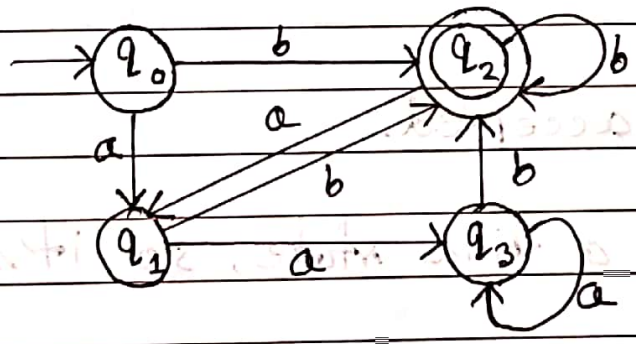
No. Date

Question - 1

(i) Transition diagram (f_s), → table

	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 diagram:



No. Date

~~b) w = ababab~~

ii) DFA can be applied to verify the password of an email. DFA can be used to first match the email and after that the password can be matched using the DFA with password stored for an email address.

Beside this DFA can help to determine whether a password is invalid or not like there should be one integer at least one alphabet, there cannot be any special character as it would lead to a dead state.

Minimum length password DFA could be built in order to accept a password with minimum length and all specifications.

No. Date

Question-2.

i) From the diagram,

State Transition table-

δ	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

ii) Given,

a) $w = aaaaa$

Transition function for this-

$\delta(S_0, a) \rightarrow S_2$

$\delta(S_2, a) \rightarrow S_4$

$\delta(S_4, a) \rightarrow S_2$

$\delta(S_2, a) \rightarrow S_4$

$\delta(S_4, a) \rightarrow S_2$

$\delta(S_2, a) \rightarrow S_4$ [not accepted]

S_4 is not final state, that is why DFA won't accept this.

No. Date

(b) $w = ababab$

Now, transition Function –

$\delta(S_0, a) \rightarrow S_2$

$\delta(S_2, b) \rightarrow S_3$

$\delta(S_3, a) \rightarrow S_1$

$\delta(S_1, b) \rightarrow S_3$

$\delta(S_3, a) \rightarrow S_2$

$\delta(S_2, b) \rightarrow S_3$

The last on is accepted.

So, as S_3 is a final state, so it's suitable for DFA.

Ans-03

(i)(a)

Components of

S (states) $\Rightarrow \{S_0, S_1, S_2, S_3, S_4, S_5\}$

I (Input symble) $\Rightarrow \{0, 1\}$

q_0 (Initial states) $\Rightarrow \{S_0\}$

F (Final states) $\Rightarrow \{S_0, S_1, S_5\}$

(i)(b)

Sequence of configeration and states:-

of given string. 0011101100

$\Rightarrow \delta(S_0, 0011101100) = \delta(S_0, 011101100) = \delta(S_0, 11101100)$

$= \delta(S_1, 1101100) = \delta(S_2, 101100) = \delta(S_3, 01100)$

$= \delta(S_5, 1100) = \delta(S_5, 100) = \delta(S_5, 00)$

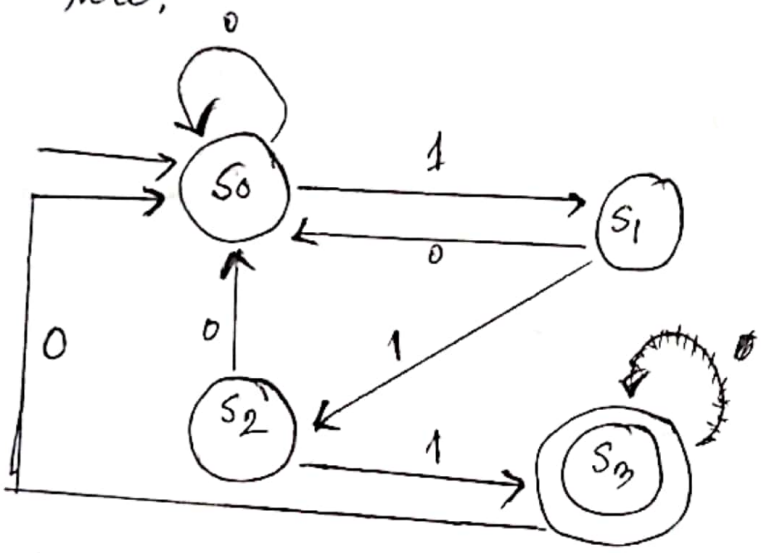
$= \delta(S_4, 0) = \delta_4$ (No final state)

So, given string is not acceptable by DFA.

(3)(ii)

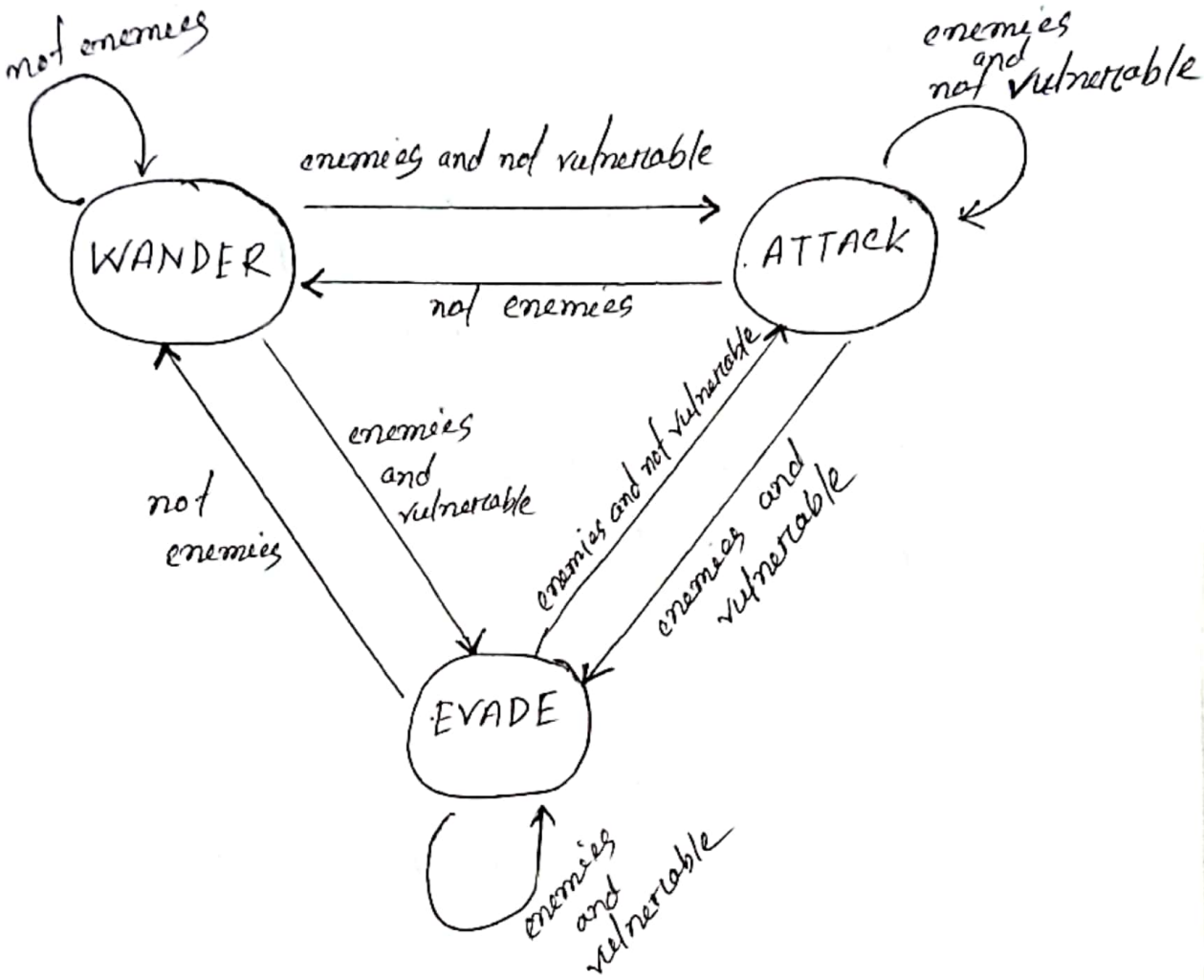
DFA that accepts the set of all bits strings that contain three consecutive once.

Now,



Here, DFA = $(\{S_0, S_1, S_2, S_3\}, \{0, 1\}, \{S_0\}, \{S_3\})$

Ans: 04



The finite state diagram has 3 nodes and arcs. The nodes represent the state of hero.

~~The three states are: WANDER, ATTACK and EVADE.~~
The arcs represent the change of state of hero. Note that hero can remain in only one of the states at a time.
The three states are: WANDER, ATTACK and EVADE. In the diagram, the inputs are shown as arcs. The hero may go from one states to another on some input which is shown by an arcs are from one states to another. He may also stay in the same state for some inputs, which are shown by a self-loop arc.

Question 5