

Problem 1 (M.1)

a)

Q =

{ q1, q2, q3, q4, q5 }

I =

{ 1, 0 }

A =

{ q2, q3 }

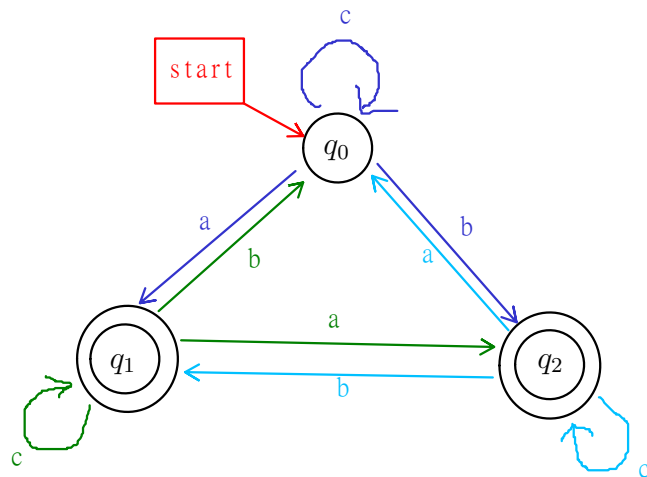
δ :

	q_1	q_2	q_3	q_4	q_5
1	q2	q3	q4	q4	q1
0	q5	q5	q5	q4	q5

Explanation:

b)

Note: Remember to label your start state and double circle your accepting states.



Explanation:

Problem 2.1 (M.2)

a)

qal

b) Label the states of in step in the boxes in the order the FSA goes through them.

q0

 →

qb1

 →

q0

 →

qb1

 →

q0

 →

qal

c)

☒ Accept ☐ Reject

Problem 2.2 (M.2)

For a sample input of 1100 the Turing Machine tape will start out looking like:

1	1	0	0	*	*	...
---	---	---	---	---	---	-----

↑
head

And after 2 steps will look like:

a	1	0	1	*	*	...
---	---	---	---	---	---	-----

↑
head


For your answers fill out the tape in the same format given in the sample input.

a)

b	1	0	0	*	*	...
---	---	---	---	---	---	-----

↑
head

b)

 Accept \bigcirc Reject

0	1	0	1	1	1	
0	1	1	0	0	0	...

↑
head

a)

$$\begin{aligned}
 (q_{start}, 0) &= (q_2, b, R) = b \begin{array}{cccc} 1 & 0 & 1 & * \\ & & H & \end{array} * \\
 (q_2, 1) &= (q_2, 1, R) = b \begin{array}{cccc} 1 & 0 & 1 & * \\ & & H & \end{array} * \\
 (q_2, 0) &= (q_2, 0, R) = b \begin{array}{cccc} 1 & 0 & 1 & * \\ & & H & \end{array} * \\
 (q_2, 1) &= (q_2, 1, R) = b \begin{array}{cccc} 1 & 0 & 1 & * \\ & & H & \end{array} * \\
 (q_2, *) &= (q_4, *, L) = b \begin{array}{cccc} 1 & 0 & 1 & * \\ & & H & \end{array} * \\
 (q_4, 1) &= (q_4, 0, L) = b \begin{array}{cccc} 1 & 0 & 0 & * \\ & & H & \end{array} *
 \end{aligned}$$

b)

$$\begin{aligned}
(q_{\text{start}}, 0) &= (q_2, b, R) = b \quad 1 \quad 0 \quad 1 \quad 1 \quad 1 \quad * \\
&\quad \quad \quad H \\
(q_2, 1) &= (q_2, 1, R) = b \quad 1 \quad 0 \quad 1 \quad 1 \quad 1 \quad * \\
&\quad \quad \quad H \\
(q_2, 0) &= (q_2, 0, R) = b \quad 1 \quad 0 \quad 1 \quad 1 \quad 1 \quad * \\
&\quad \quad \quad H \\
(q_2, 1) &= (q_2, 1, R) = b \quad 1 \quad 0 \quad 1 \quad 1 \quad 1 \quad * \\
&\quad \quad \quad H \\
(q_2, 1) &= (q_2, 1, R) = b \quad 1 \quad 0 \quad 1 \quad 1 \quad 1 \quad * \\
&\quad \quad \quad H \\
(q_2, 1) &= (q_2, 1, R) = b \quad 1 \quad 0 \quad 1 \quad 1 \quad 1 \quad * \\
&\quad \quad \quad H \\
(q_2, *) &= (q_4, *, L) = b \quad 1 \quad 0 \quad 1 \quad 1 \quad 1 \quad * \\
&\quad \quad \quad H \\
(q_4, 1) &= (q_4, 0, L) = b \quad 1 \quad 0 \quad 1 \quad 1 \quad 0 \quad * \\
&\quad \quad \quad H \\
(q_4, 1) &= (q_4, 0, L) = b \quad 1 \quad 0 \quad 1 \quad 0 \quad 0 \quad * \\
&\quad \quad \quad H \\
(q_4, 1) &= (q_4, 0, L) = b \quad 1 \quad 0 \quad 0 \quad 0 \quad 0 \quad * \\
&\quad \quad \quad H \\
(q_4, 0) &= (q_5, 1, L) = b \quad 1 \quad 1 \quad 0 \quad 0 \quad 0 \quad * \\
&\quad \quad \quad H \\
(q_5, 1) &= (q_5, 1, L) = b \quad 1 \quad 1 \quad 0 \quad 0 \quad 0 \quad * \\
&\quad \quad \quad H \\
(q_5, b) &= (q_{\text{acc}}, 0, L) = 0 \quad 1 \quad 1 \quad 0 \quad 0 \quad 0 \quad *
\end{aligned}$$

Problem 3.1 (M.3)

a)

Note: Remember to label your start state and double circle your accepting states.

q_1

q_2

q_3

q_4

Documentation:

q_1 :

q_2 :

q_3 :

q_4 :

Problem 3.2 (M.2)

$Q =$

$\Sigma = \{a, b\}$

$\Gamma =$

δ :

	q_{start}	q_{ra}	q_{rb}		
a	(, α , L)	(q_{ra} , a , L)	(q_{rb} , a , L)	(, ,)	(, ,)
b	(, β , L)	(q_{ra} , b , L)	(q_{rb} , b , L)	(, ,)	(, ,)
x	(q_{rej} , x , L)	(q_{ra} , x , L)	(q_{rb} , x , L)	(, ,)	(, ,)
α	(q_{rej} , α , L)	(, α , L)	(, α , L)	(, ,)	(, ,)
β	(q_{rej} , β , L)	(, β , L)	(, β , L)	(, ,)	(, ,)
γ	(q_{rej} , γ , L)	(, γ , L)	(, γ , L)	(, ,)	(, ,)
$*$	(q_{rej} , $*$, L)	(, $*$, L)	(, $*$, L)	(, ,)	(, ,)
	(, ,)	(, ,)	(, ,)	(, ,)	(, ,)
	(, ,)	(, ,)	(, ,)	(, ,)	(, ,)
	(, ,)	(, ,)	(, ,)	(, ,)	(, ,)
	(, ,)	(, ,)	(, ,)	(, ,)	(, ,)

Documentation for states on this page (no need to document states that were provided):

Use this page if you have more than 5 states in your Turing Machine for 3.2.

a	(, ,)	(, ,)	(, ,)	(, ,)	(, ,)
b	(, ,)	(, ,)	(, ,)	(, ,)	(, ,)
x	(, ,)	(, ,)	(, ,)	(, ,)	(, ,)
α	(, ,)	(, ,)	(, ,)	(, ,)	(, ,)
β	(, ,)	(, ,)	(, ,)	(, ,)	(, ,)
γ	(, ,)	(, ,)	(, ,)	(, ,)	(, ,)
$*$	(, ,)	(, ,)	(, ,)	(, ,)	(, ,)
	(, ,)	(, ,)	(, ,)	(, ,)	(, ,)
	(, ,)	(, ,)	(, ,)	(, ,)	(, ,)
	(, ,)	(, ,)	(, ,)	(, ,)	(, ,)
	(, ,)	(, ,)	(, ,)	(, ,)	(, ,)

Documentation for states on this page:

Problem 3.3 (M.3)

Description:

Explanation: