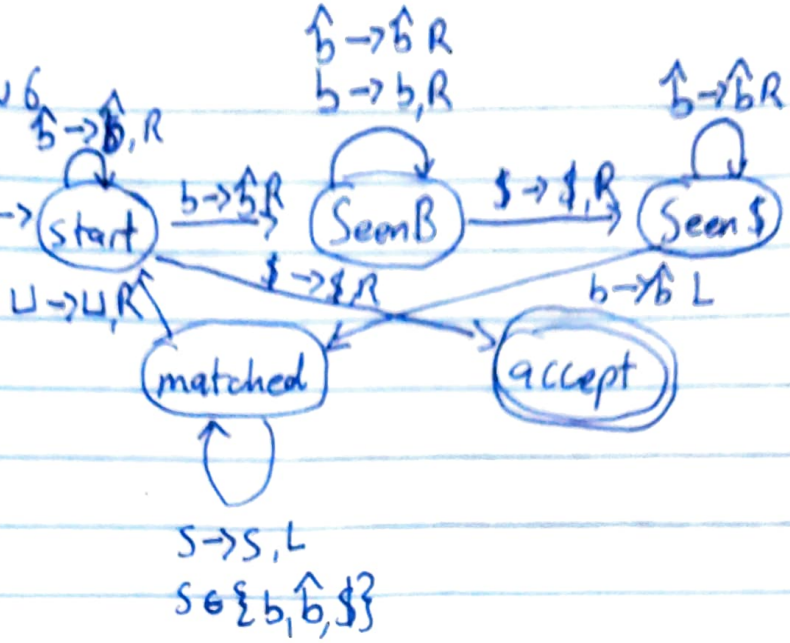
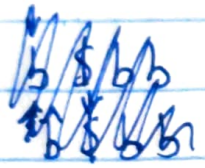
Hw 6

1 a)



b)



b $ b b
b̂ $ b b
b̂ $ b̂ b
b̂ $ b̂ b
⊔ b̂ $ b̂ b
⊔ b̂ $ b̂ b
⊔ b̂ $ b̂ b

Accept

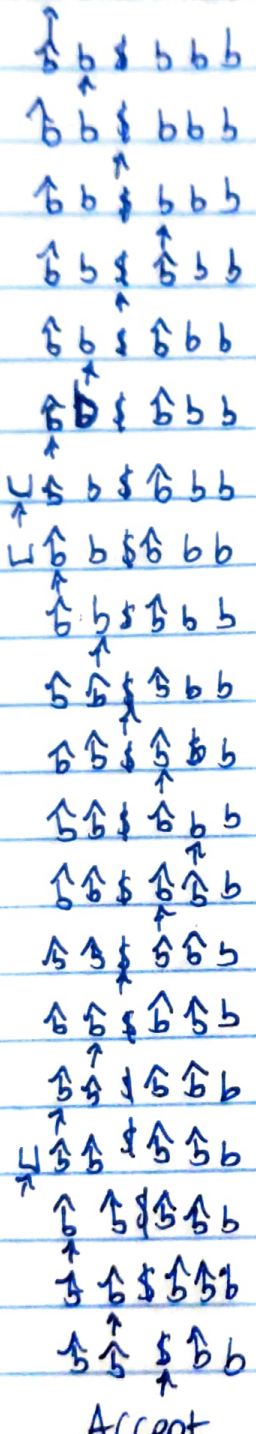
c) - ε

Reject (Not defined)

- b b $ b
b̂ b $ b
b̂ b̂ $ b
b̂ b̂ $ b̂
b̂ b̂ $ b̂
b̂ b̂ $ b̂
⊔ b̂ b̂ $ b̂
⊔ b̂ b̂ $ b̂
b̂ b̂ $ b̂
b̂ b̂ $ b̂
b̂ b̂ $ b̂
b̂ b̂ $ b̂ ⊔

Reject

1c) - bb$bbb



Accept

1c) - $b

Accept

1d) $L(M) = \{bb\$bbb, \$b\}$

$= \{ (b)^i \$ (b)^j \mid i \neq j \}$

2 a) $Q = \{q_0, q_1, q_2\}$
start $= q_0$

q_0: Scan right until "1" (if "#" goto q_3)
Cross "1" then move to q_1; scan Right

q_1: Scan right until "$" (if ⊔ is reached then reject)
Cross "$" then move to q_2; scan left

q_2: Scan left until ⊔
move to q_0

b) $Q = \{q_3, q_4, q_5, q_6, q_7, q_8\}$

q_3: 0 → goto q_4; Scan Right
1 → goto q_5; scan Right

q_4: Scan right until "$"
goto q_6

q_5: Scan right until "$"
goto q_7

q_6: scan right until 0
Cross out 0 then goto q_8 Scan left

q_7: scan right until 1
Cross out 1 then goto q_8 Scan left

q_8: scan left until "#"
goto q_3

$\Gamma = \{0, 1, \#, \$, X, \sqcup\}$

$\Sigma = \{0, 1, \#, \$\}$

2 a) $Q = \{q_0, q_1, q_2\}$

$q_0 = q_0$

$\delta(q, s) = s \; 1 \to X, R, q_1$

$\Sigma - \{\$\} \to S, R, q_1$

$\delta(q, s) = (q_0, 1) \to (q_1, X, R)$

$(q_1, s) \to (q_1, s, R)$ $s \in \Gamma - \{\}$

$(q_1, \$) \to (q_2, X, L)$

$(q_2, s) \to (q_2, s, L)$ $s \in \Sigma - \{\}$

$(q_2, \sqcup) \to (q_0, R, L)$ Reject

2) $Q = \{q_0, q_1, q_2, q_3, q_4, q_5\}$

$q_0 = q_0$

$\delta(q,s) = (q_0, 0) \to (q_1, \sqcup, R)$

$(q_0, 1) \to (q_2, \sqcup R)$

$(q_1, s) \to (q_1, s, R) \quad s \in \{0, 1, X\}$

$(q_2, s) \to (q_2, s, R) \quad s \in \{0, 1, X\}$

$(q_1, \$) \to (q_3, \$, R)$

$(q_2, \$) \to (q_4, \$, R)$

$(q_3, X) \to (q_3, X, R)$

$(q_4, X) \to (q_4, X, R)$

$(q_3, 0) \to (q_5, X, L)$

$(q_4, 1) \to (q_5, X, L)$

$(q_5, s) \to (q_5, s, L) \quad s \in \{0, 1, X, \$, \sqcup\}$

$(q_5, \#) \to (q_0, \#, R)$

$(q_0, \sqcup) \to (q_0 \sqcup R)$

2 c) $Q = \{q_9, q_{10}, q_{11}, q_{12}\}$

q_9: Scan right until #
goto q_{10} scan right

q_{10}: Scan right until $
goto q_{11} Scan right

q_{11}: Scan right until $
(0 | 1) → Reject
goto q_{12}

(q_{12}): Accept

2. $Q = \{q_0, q_1, q_2, q_3\}$

$(q_0, s) \to (q_0, s, L)$ $s \in \{0, 1, \sqcup, X\}$

$(q_0, \#) \to (q_1, \# R)$

$(q_1, s) \to (q_1, s, R)$ $s \in \{0, 1, X, \sqcup\}$

$(q_1, \$) \to (q_2, \$ R)$

$(q_2, X) \to (q_2, X, R)$

$(q_2, \$) \to (q_3, \$, R)$

3 q_0 start

q_0: 0 → goto q_1 scan right → replace with x_0
1 → goto q_2 scan right → replace with x_1

q_1: Scan right until $
goto q_3

q_2: Scan right until $
goto q_4

q_3: Scan right until 0
replace with y_0 scan left
goto q_5

q_4: scan right until 1
replace with y_1 scan left
goto q_5

q_5: scan left until x_0 or x_1
Scan right goto q_0.
else goto q_6

q_6: Scan to leftmost point
goto q_7

q_7: x_0 → ⊔
x_1 → scan right goto q_8

q_8: y_0 → ⊔
y_1 → scan left goto q_{10}

scan right until ⊔

q_{10}: x_0 → 0 y_0 → 0
x_1 → 1 y_1 → 0
} ⇒ q_{11}

$\$ \rightarrow$ goto q_{17}

3 q_{11} : leftmost $\rightarrow 0 \rightarrow$ goto q_{12} } replace with X
$1 \rightarrow$ goto q_{13} }

q_{12} : ~~goto~~ scan until \$
goto q_{14}

q_{13} : scan until \$
goto q_{15}

q_{14} : scan right
011 replace with "y" ~~Scan~~
scan left
goto q_{16}

q_{15} : Scan right
0 → reject ~~\$ → blank~~ ⊔ accept
1 → replace with y goto q_{16} scan left

q_{16} : Scan left until X
goto q_{11}

q_{17} : scan until \$
goto q_{18}

q_{18} : Scan until ⊔
~~Accept~~ goto q_{19}

q_{19} : Accept.