

1. a)  $A = (Q, \Sigma, \delta, q_0, F)$

$Q = \{1, 2\} \quad \Sigma = \{a, b\} \quad q_0 = \{1\} \quad F = \{1\}$

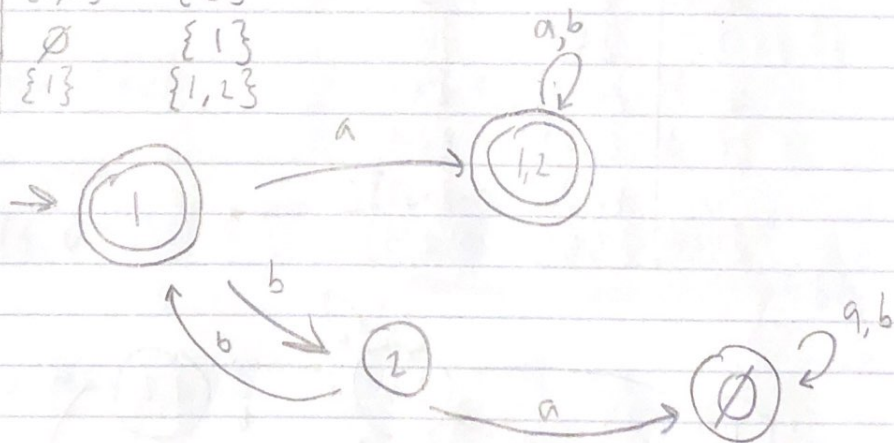
$\delta$	a	b
1	$\{1, 2\}$	$\{2\}$
2	$\emptyset$	$\{1\}$

b)  $A_{DFA} = (Q', \Sigma, \delta', q'_0, F')$

$Q' = \{\emptyset, \{1\}, \{2\}, \{1, 2\}\} \quad \Sigma = \{a, b\} \quad q'_0 = \{\{1\}\} \quad F' = \{\{1\}, \{1, 2\}\}$

$\delta'$	a	b
$\emptyset$	$\emptyset$	$\emptyset$
$\{1\}$	$\{1, 2\}$	$\{2\}$
$\{2\}$	$\emptyset$	$\{1\}$
$\{1, 2\}$	$\{1\}$	$\{1, 2\}$

c)



d)  $B = (Q, \Sigma, \delta, q_0, F)$

$Q = \{1, 2, 3\} \quad \Sigma = \{a, b\} \quad q_0 = \{1\} \quad F = \{2\}$

1) cont'd.  $\rightarrow$

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p2

1) d contd)

$$\delta =$$

$\delta$	a	b	$\epsilon$
1	$\{3\}$	$\emptyset$	$\{2\}$
2	$\{1\}$	$\emptyset$	$\emptyset$
3	$\{2\}$	$\{2,3\}$	$\emptyset$

e)  $B_{DFA} = (Q', \Sigma, \delta', q_0', F')$

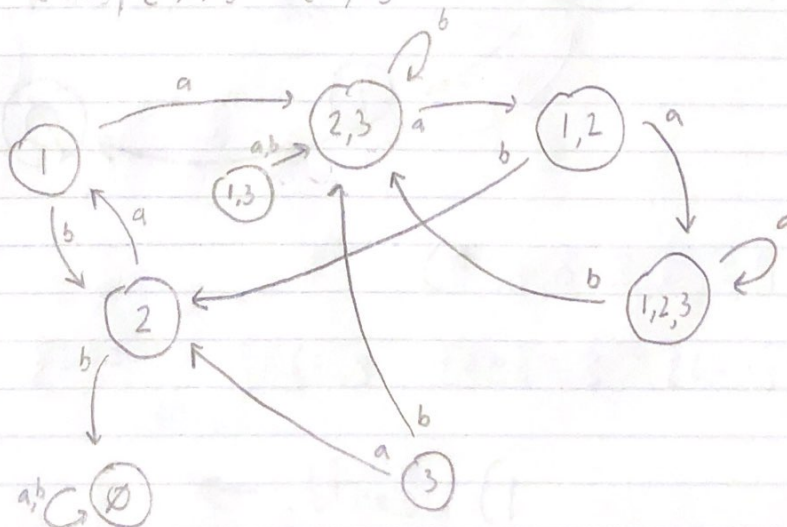
$Q' = \{\emptyset, \{1\}, \{2\}, \{3\}, \{1,2\}, \{2,3\}, \{1,3\}, \{1,2,3\}\}$   $\Sigma = \{a, b\}$

$q_0' = \{\{2,3\}\}$   $F' = \{\{2,3\}, \{1,2,3\}, \{2,3\}, \{1,2,3\}\}$

$$\delta' =$$

$\delta'$	a	b
$\emptyset$	$\emptyset$	$\emptyset$
$\{1\}$	$\{2,3\}$	$\{2\}$
$\{2\}$	$\{1\}$	$\emptyset$
$\{3\}$	$\{2\}$	$\{2,3\}$
$\{1,2\}$	$\{1,2,3\}$	$\{2,3\}$
$\{2,3\}$	$\{1,2\}$	$\{2,3\}$
$\{1,3\}$	$\{2,3\}$	$\{2,3\}$
$\{1,2,3\}$	$\{1,2,3\}$	$\{2,3\}$

f)



Z.

$$a) a^* b^* \quad \begin{array}{l} \text{in: } ab, aabb \\ \text{out: } ba, baa \end{array}$$

$$b) a(ba)^* b \quad \begin{array}{l} \text{in: } ab, abab \\ \text{out: } aqa, qaqa \end{array}$$

$$c) a^* \cup b^* \quad \begin{array}{l} \text{in: } a, b \\ \text{out: } ba, baa \end{array}$$

$$d) (aaa)^* \quad \begin{array}{l} \text{in: } \epsilon, aaa \\ \text{out: } b, bb \end{array}$$

$$e) \Sigma^* a \Sigma^* b \Sigma^* a \Sigma^* \quad \begin{array}{l} \text{in: } aba, aaba \\ \text{out: } a, b \end{array}$$

$$f) aba \cup bab \quad \begin{array}{l} \text{in: } aba, bab \\ \text{out: } a, b \end{array}$$

$$g) (\epsilon \cup a)b \quad \begin{array}{l} \text{in: } b, ab \\ \text{out: } aaaaaa aua, bbbbbb bb \end{array}$$

$$h) (a \cup ba \cup bb) \Sigma^* \quad \begin{array}{l} \text{in: } a, ba \\ \text{out: } \epsilon, b \end{array}$$

$$i) (a \cup \emptyset) \Sigma^* \quad \begin{array}{l} \text{in: } ab, abb \\ \text{out: } b, bb \end{array}$$



1502

ass. 2

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p4

3.

a.  $00 \Sigma^* 11$

b.  $\Sigma^* 0 \Sigma^* 0 \Sigma^* 0 \Sigma^*$

c.  $\Sigma^* 0011 \Sigma^*$

d.  $\Sigma 1 \Sigma$

e.  $(0(\Sigma \Sigma)^* \cup (1(\Sigma \Sigma)^*))^*$

f.  $(\Sigma^* 0 \Sigma^* 1 \Sigma^* 1 \Sigma^*) \cup (\Sigma^* 1 \Sigma^* 0 \Sigma^* 1 \Sigma^*) \cup (\Sigma^* 1 \Sigma^* 1 \Sigma^* 0 \Sigma^*)$

g.  $\Sigma \cup \Sigma \Sigma \cup \Sigma \Sigma \Sigma \cup \Sigma \Sigma \Sigma \Sigma$

h.  $1^* (01)^*$

i.  $(0 \Sigma)^*$

j.  $(0^* 0 0^* 0 0^* 1 0^*) \cup (0^* 0 0^* 1 0^* 0 0^*) \cup (0^* 1 0^* 0 0^* 0 0^*)$

k.  $\epsilon \cup 0$

l.  $(0^* 1 0^* 1 0^*) \cup (00)^*$

m.  $\emptyset$

n.  $\Sigma^+$