0 → q_1
q_1 → different se

MINIMIZATION OF FINITE AUTOMATA

2017 Spring 1(b)

Solution:

Here, the given transition table is

δ / Σ	0	1
→ q_0	q_1	q_2
* q_1	q_2	q_3
q_2	q_2	q_2
* q_3	q_5	q_2
* q_4	q_4	q_2
* q_5	q_4	q_2
q_6	q_5	q_6
q_7	q_5	q_6

Now, zero equivalence classes are:

$$\Pi_0 = \{\{q_0, q_2, q_6, q_7\}, \{q_1, q_3, q_4, q_5\}\}$$

1 equivalence tests:

$q_0 \not\equiv q_2$

$q_6 \equiv q_0$

$q_7 \equiv q_0$

$q_1 \not\equiv q_3$

$q_1 \not\equiv q_4$

$q_3 \equiv q_4$

$q_1 \not\equiv q_5$

$q_3 \equiv q_5$

$\{q_0, q_6, q_7\}$
$\{q_2\}$
$\{q_1\}$
$\{q_3, q_4, q_5\}$

Hence, 1 equivalence classes are:

$$\Pi_1 = \{\{q_0, q_6, q_7\}, \{q_2\}, \{q_1\}\{q_3, q_4, q_5\}\}$$

P doesn't contains a null [illegible] provided that

2-equivalence tests:

$q_0 \not\equiv q_6$
$q_0 \not\equiv q_7$
$q_6 \equiv q_7$

$q_3 \equiv q_4$
$q_3 \equiv q_5$

$\{q_0\}$
$\{q_6, q_7\}$
$\{q_2\}\{q_1\}$
$\{q_3, q_4, q_5\}$

$\therefore \Pi_2 = \{\{q_0\}, \{q_6, q_7\}, \{q_2\}\{q_1\}, \{q_3, q_4, q_5\}\}$

3-equivalence tests:

$q_6 \equiv q_7$
$q_3 \equiv q_4$
$q_3 \equiv q_5$

$\{q_0\}$
$\{q_6, q_7\}$
$\{q_2\}$
$\{q_1\}$
$\{q_3, q_4, q_5\}$

$\therefore \Pi_3 = \{\{q_0\}, \{q_6, q_7\}, \{q_1\}, \{q_2\}, \{q_3, q_4, q_5\}\}$

Since $\Pi_3 = \Pi_2$. The equivalence tests stops. The sets in Π_3 are new states of minimized DFA.

Let us construct the transition table for minimized DFA

Q/Σ	0	1
→{q0}	{q1}	{q2}
*{q1}	{q1}	{q3, q4, q5}
{q2}	{q2}	{q2}
*{q3, q4, q5}	{q3, q4, q5}	{q2}
{q6, q7}	{q3, q4, q5}	{q6, q7}

The transition diagram is: