**S1**
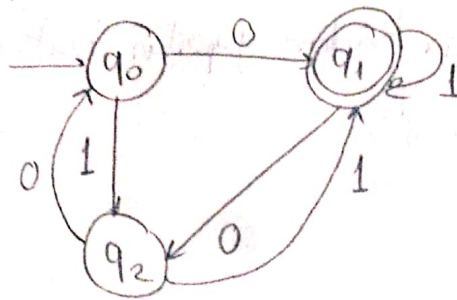


$q_0$
$\downarrow 1$
$q_2$
$\downarrow 0$
$q_0$
$\downarrow 0$
$q_1$
$\downarrow 1$
$q_1$

Automaton $= \{Q, \Sigma, \delta, q_0, F\}$

$A = \{(\{q_0, q_1, q_2\}; \{0,1\}, \delta, q_0, \{q_1\})\}$

$q_0 : q_0 , \quad F : q_1$

$\delta(q_0, 0) = q_1 \qquad \delta(q_1, 1) = q_1 \qquad \delta(q_2, 0) = q_0$
$\delta(q_0, 1) = q_2 \qquad \delta(q_1, 0) = q_2 \qquad \delta(q_2, 1) = q_1$

$\hat{\delta}(q_0, 1001) = (q_2 \, q_0 \, q_1 \, q_1) \Rightarrow \hat{\delta}(q_0, 1001) = \{q_1\}$ kabul.

$\hat{\delta}(q_0, 1001) \to \hat{\delta}(q_2, 001) \to \hat{\delta}(q_0, 01) \to \hat{\delta}(q_1, 1) \Rightarrow \text{ⓠ}_1 - \text{final durum.}$

**S2**

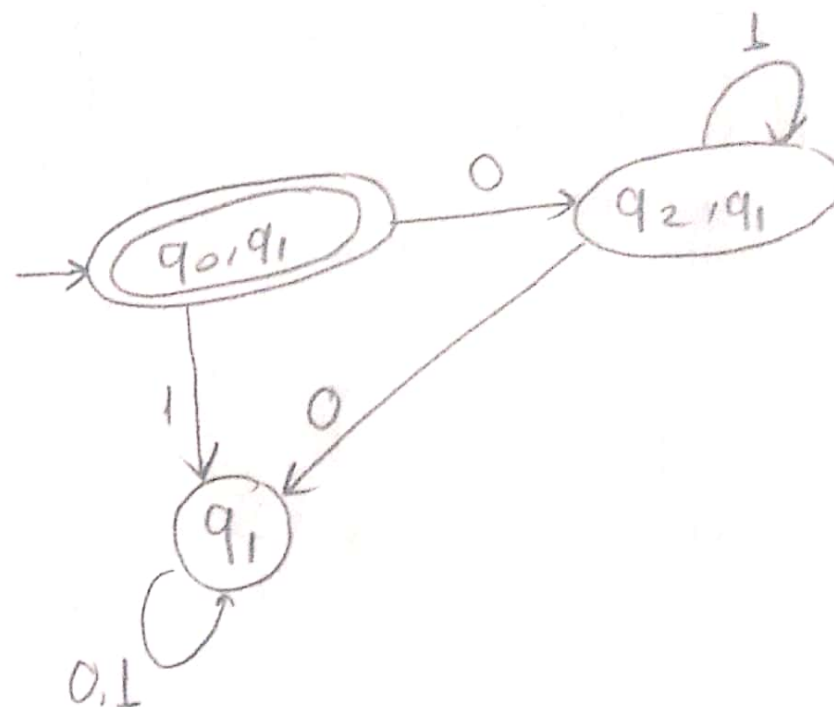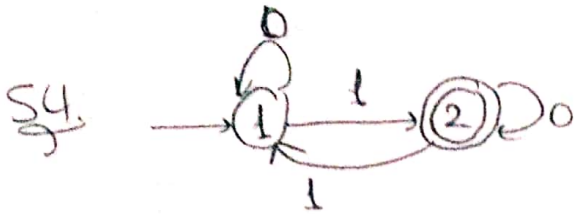| | 0 | 1 |
|---|---|---|
| → $q_0$ | $\{q_2\}$ | $\{q_0, q_2\}$ |
| $q_2$ | $\emptyset$ | $q_1$ |
| * $q_1$ | $\{q_1\}$ | $\emptyset$ |
| $\{q_0, q_2\}$ | $\{q_2\}$ | $\{q_0, q_2, q_1\}$ |
| *$\{q_0, q_2, q_1\}$ | $\{q_2, q_1\}$ | $\{q_0, q_2, q_1\}$ |
| *$\{q_2, q_1\}$ | $\{q_1\}$ | $\{q_1\}$ |

$\Rightarrow$
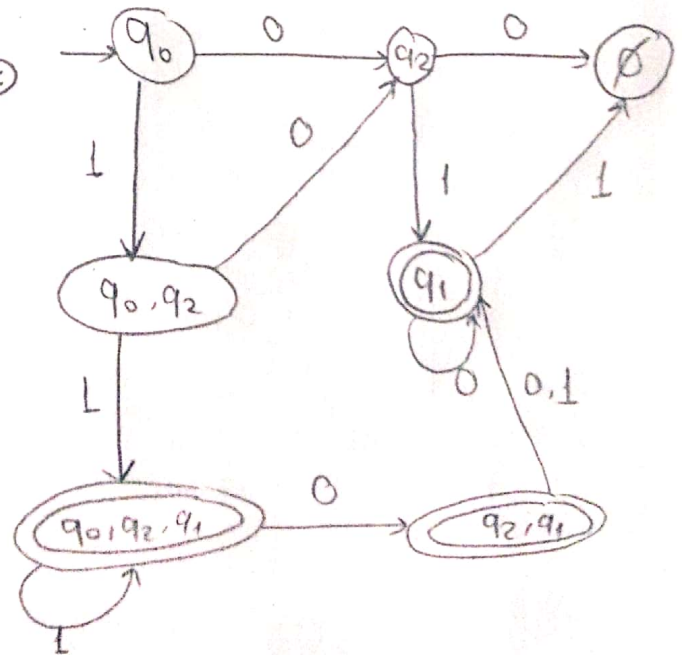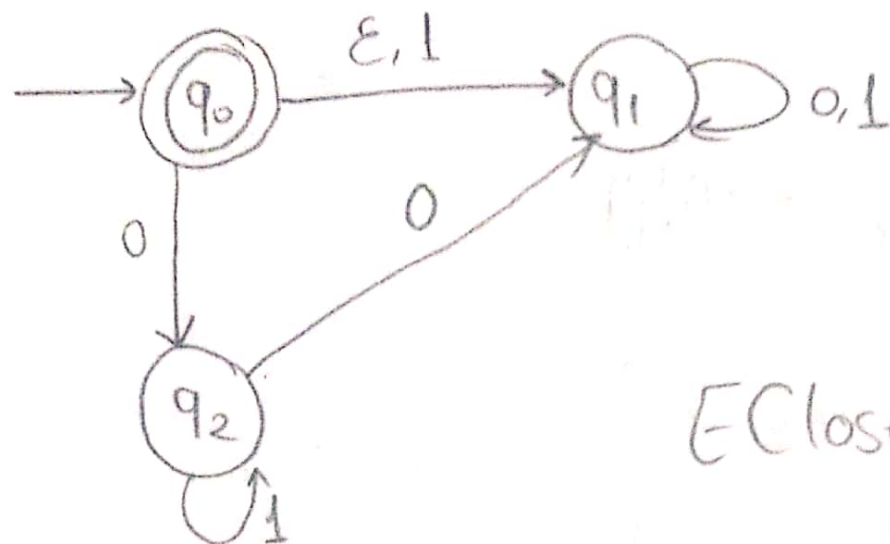
Aljoud MHO Ali 18290992

BLM3064

$\varepsilon, 1$

$q_0$    $q_1$    $0,1$

$0$    $0$

$q_2$

$1$

$EClose(q_0) = \{q_0, q_1\}$

| | 0 | 1 |
|---|---|---|
| $\rightarrow * \{q_0, q_1\}$ | $\{q_2, q_1\}$ | $\{q_1\}$ |
| $\{q_1\}$ | $\{q_1\}$ | $\{q_1\}$ |
| $\{q_2, q_1\}$ | $\{q_1\}$ | $\{q_2, q_1\}$ |

$q_0, q_1$    $0$    $q_2, q_1$    $1$

$1$    $0$

$q_1$

$0, 1$

S4.



$R_{11}^{(0)}$ | $\varepsilon + 0$

$R_{12}^{(0)}$ | $1$

$R_{21}^{(0)}$ | $1$

$R_{22}^{(0)}$ | $\varepsilon + 0$

$$\Rightarrow R_{ij}^{(1)} = R_{ij}^{(0)} + R_{i1}^{(0)} (R_{11}^{(0)})^* R_{1j}^{(0)}$$

| | | |
|---|---|---|
| $R_{11}^{(1)}$ | $(\varepsilon+0) + (\varepsilon+0)(\varepsilon+0)^*(\varepsilon+0)$ | $0^*$ |
| $R_{12}^{(1)}$ | $1 + (\varepsilon+0)(\varepsilon+0)^* 1$ | $0^* 1$ |
| $R_{21}^{(1)}$ | $1 + 1(\varepsilon+0)^*(\varepsilon+0)$ | $0^* 1$ |
| $R_{22}^{(1)}$ | $(\varepsilon+0) + 1(\varepsilon+0)^* 1$ | $(\varepsilon+0) + 10^* 1$ |

$$R_{ij}^{(2)} = R_{ij}^{(1)} + R_{i2}^{(1)} (R_{22}^{(1)})^* R_{2j}^{(1)}$$

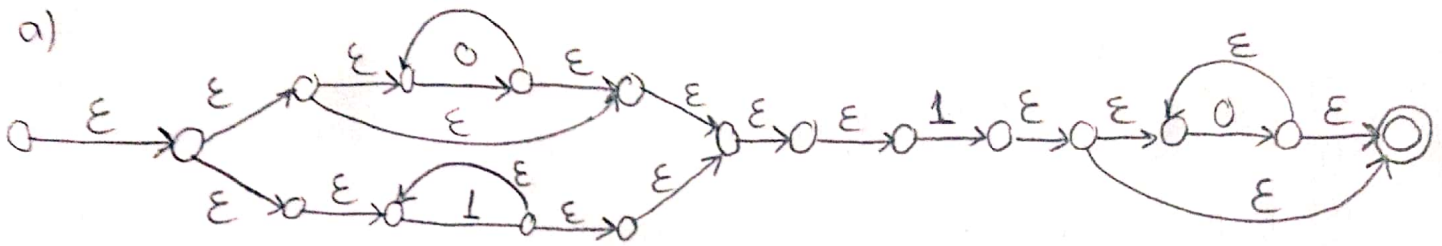| | | |
|---|---|---|
| $R_{11}^{(2)}$ | $0^* + 0^* 1 [(\varepsilon+0) + 10^* 1]^* (0^* 1$ | $0^* + 0^* 1 [(\varepsilon+0) + 10^* 1] 0^* 1$ |
| $R_{12}^{(2)}$ | $0^* 1 + 0^* 1 [(\varepsilon+0) + 10^* 1]^* [(\varepsilon+0) + 10^* 1]$ | $[(\varepsilon+0) + 10^* 1]^* 0^* 1$ |
| $R_{21}^{(2)}$ | $0^* 1 + [(\varepsilon+0) + 10^* 1][(\varepsilon+0) + 10^* 1]^* 0^* 1$ | $0^* 1 [(\varepsilon+0) + 10^* 1]$ |
| $R_{22}^{(2)}$ | $[(\varepsilon+0) + 10^* 1] + [(\varepsilon+0) + 10^* 1][(\varepsilon+0) + 10^* 1]^* [(\varepsilon+0) + 10^* 1]$ | $[(\varepsilon+0) + 10^* 1]^+$ |

$$\Rightarrow DFA'\min \ dili = R_{12}^{(2)} = [(\varepsilon+0) + 10^* 1]^* 0^* 1$$
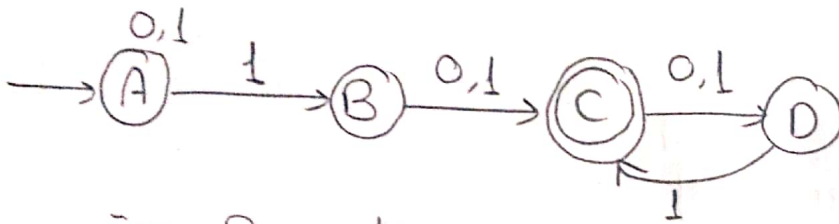
S5.

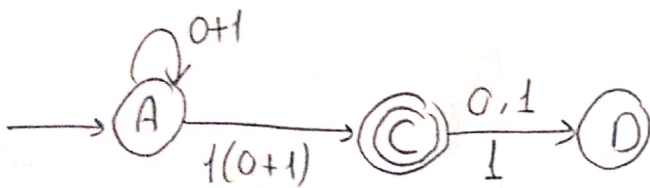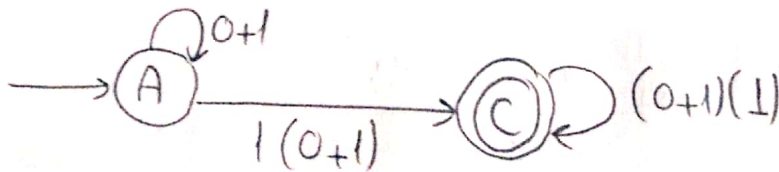$(0^* + 1^+)^+$

$1\ 0^*$

a)



b)



önce B yi eliyoruz



Sonra D yi eliyoruz



NFA'nın dili : $(0+1)^* [1(0+1)][(0+1)(1)]^*$

$\Rightarrow (0+1)^* [1(0+1)]^+$