# Solutions for Assignment #7

## Assignment Information

Maximum grade 20

Due date October 13, 2004

Instructions Textbook, pages 106
Problems:
3.2.1 c) and d)
3.2.2
3.2.4 b) and c)

3.2.1 c)

| | |
|---|---|
| $R^{(2)}_{11}$ | 1*+1*0(11*0)*11* |
| $R^{(2)}_{12}$ | 1*0(11*0)* |
| $R^{(2)}_{13}$ | 1*0(11*0)*0 |
| $R^{(2)}_{21}$ | (11*0)*11* |
| $R^{(2)}_{22}$ | (11*0)* |
| $R^{(2)}_{23}$ | (11*0)*0 |
| $R^{(2)}_{31}$ | 1(11*0)*11* |
| $R^{(2)}_{32}$ | 1(11*0)* |
| $R^{(2)}_{33}$ | ε +0+1(11*0)*0 |

3.2.1 d)

$R^{(3)}_{13} = R^{(2)}_{13} + R^{(2)}_{13} (R^{(2)}_{33})^* R^{(2)}_{33}$

$= 1*0(11*0)*0 + (1*0(11*0)*0)(\varepsilon +0+1(11*0)*0)^* (\varepsilon +0+1(11*0)*0)$

$= (1*0(11*0)*0) (0+1(11*0)*0)^*$

3.2.2 a)

| | |
|---|---|
| $R^{(0)}_{11}$ | ε |
| $R^{(0)}_{12}$ | 0 |
| $R^{(0)}_{13}$ | 1 |
| $R^{(0)}_{21}$ | 0 |
| $R^{(0)}_{22}$ | ε |
| $R^{(0)}_{23}$ | 1 |
| $R^{(0)}_{31}$ | 1 |
| $R^{(0)}_{32}$ | 0 |
| $R^{(0)}_{33}$ | ε |

3.2.2 b)

| | |
|---|---|
| $R^{(1)}_{11}$ | ε |
| $R^{(1)}_{12}$ | 0 |
| $R^{(1)}_{13}$ | 1 |
| $R^{(1)}_{21}$ | 0 |
| $R^{(1)}_{22}$ | ε +00 |
| $R^{(1)}_{23}$ | 1+01 |
| $R^{(1)}_{31}$ | 1 |
| $R^{(1)}_{32}$ | 0+10 |
| $R^{(1)}_{33}$ | ε +11 |

3.2.2 c)

| | |
|---|---|
| $R^{(2)}_{11}$ | ε +0(00)*0 |
| $R^{(2)}_{12}$ | 0(00)* |
| $R^{(2)}_{13}$ | 1+0(00)*(1+01) |
| $R^{(2)}_{21}$ | (00)*0 |
| $R^{(2)}_{22}$ | (00)* |
| $R^{(2)}_{23}$ | (00)*(1+01) |
| $R^{(2)}_{31}$ | 1+( ε +1)00(00)* |
| $R^{(2)}_{32}$ | (0+10)(00)* |
| $R^{(2)}_{33}$ | ε +11+(0+10)(00)*(1+01) |

3.2.2 d)

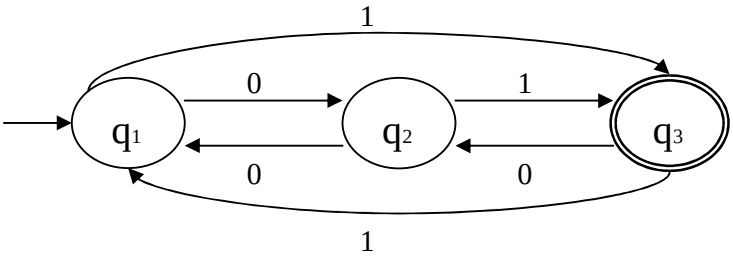
$R^{(3)}_{13} = R^{(2)}_{13} + R^{(2)}_{13} (R^{(2)}_{33})^* R^{(2)}_{33}$

$= \{1+0(00)^*(1+01)\} + \{1+0(00)^*(1+01)\}$

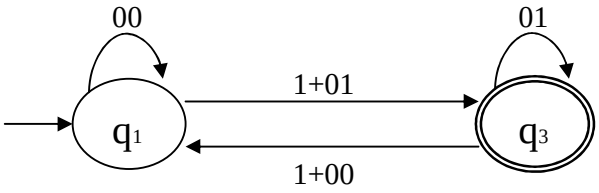
$\{ \varepsilon + 11+(0+10)(00)^*(1+01)\}^* \{ \varepsilon + 11+(0+10)(00)^*(1+01)\}$

$= \{1+0(00)^*(1+01)\} \{11+(0+10)(00)^*(1+01)\}^*$

3.2.2 e)

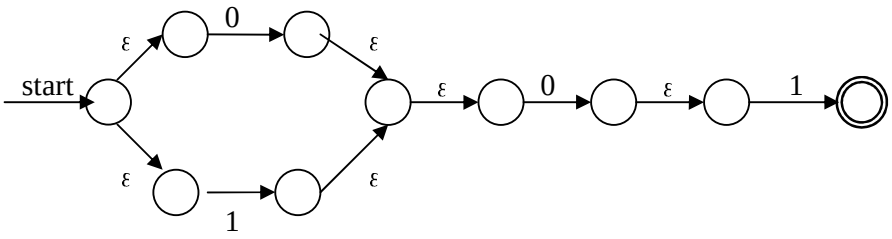



Eliminating $q_2$




Regular Expression = $\{00+(1+01)(01)^*(1+00)\}^*$ $(1+01)(01)^*$

3.2.4 b) (0+1)01




3.2.4 c) 00(0+1)*