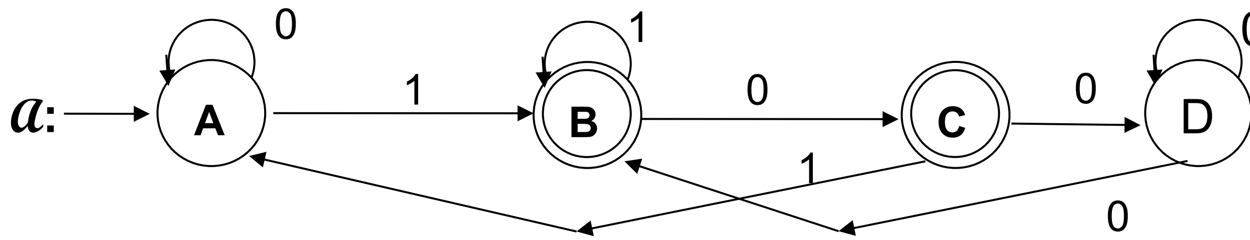
Sample Assign # 4.1 Key

1. Convert the DFA below to a regular expression, first by using either the GNFA (or state ripping) or the R_{ij}^{k} approach, and then by using regular equations. You must show all steps in each part of this solution.



Sample Assign # 4.1 Key (R_{ij}^k)

$R_{11}^0=\lambda+0$ $R_{12}^0=1$ $R_{13}^0=\phi$ $R_{14}^0=\phi$ $R_{21}^0=\phi$ $R_{22}^0=\lambda+1$ $R_{23}^0=0$ $R_{24}^0=\phi$

$R_{31}^0=1$ $R_{32}^0=\phi$ $R_{33}^0=\lambda$ $R_{34}^0=0$ $R_{41}^0=\phi$ $R_{42}^0=0$ $R_{43}^0=\phi$ $R_{44}^0=\lambda+0$

$R_{11}^1=0^*$ $R_{12}^1=0^*1$ $R_{13}^1=\phi$ $R_{14}^1=\phi$ $R_{21}^1=\phi$ $R_{22}^1=\lambda+1$ $R_{23}^1=0$ $R_{24}^1=\phi$

$R_{31}^1=10^*$ $R_{32}^1=10^*1$ $R_{33}^1=\lambda$ $R_{34}^1=0$ $R_{41}^1=\phi$ $R_{42}^1=0$ $R_{43}^1=\phi$ $R_{44}^1=\lambda+0$

$R_{11}^2=0^*$ $R_{12}^2=0^*1^+$ $R_{13}^2=0^*1^+0$ $R_{14}^2=\phi$ $R_{21}^2=\phi$ $R_{22}^2=1^*$ $R_{23}^2=1^*0$ $R_{24}^2=\phi$

$R_{31}^2=10^*$ $R_{32}^2=10^*1^+$ $R_{33}^2=\lambda+10^*1^+0$ $R_{34}^2=0$ $R_{41}^2=\phi$ $R_{42}^2=01^*$ $R_{43}^2=01^*0$ $R_{44}^2=\lambda+0$

$R_{12}^3=0^*1^+ + 0^*1^+0(10^*1^+0)^*10^*1^+$

$R_{13}^3=0^*1^+0(10^*1^+0)^*$

$R_{14}^3=0^*1^+0(10^*1^+0)^*0$

$R_{42}^3=01^*+01^*0(10^*1^+0)^*10^*1^+$

$R_{43}^3=01^*0(10^*1^+0)^*$

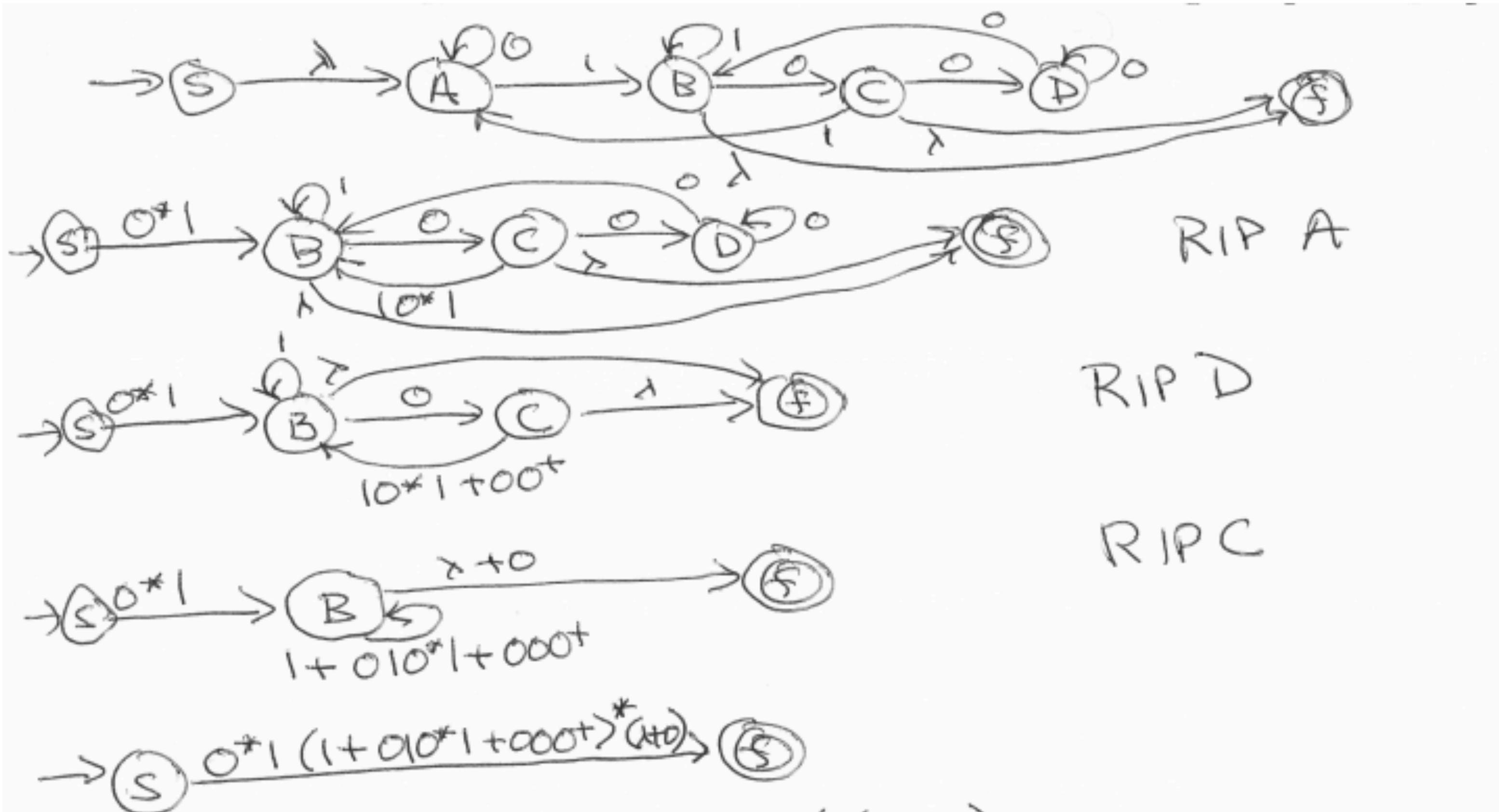
$R_{44}^3=\lambda+0+01^*0(10^*1^+0)^*0$

$R_{12}^4=0^*1^+ + 01^+0(10^*1^+0)^*10^*1^+ + 0^*1^+0(10^*1^+0)^*0(0+01^*0(10^*1^+0)^*0)^*(01^*+01^*0(10^*1^+0)^*10^*1^+)$

$R_{13}^4=0^*1^+0(10^*1^+0)^*0+0^*1^+0(10^*1^+0)^*0(10^*1^+0)^*0(0+01^*0(10^*1^+0)^*0)^*(01^*0(10^*1^+0)^*)$

L = $R_{12}^4 + R_{13}^4$

Sample Assign # 4.1 Key (Rip)



$$L = 0^*1(1+010^*1+000^+)^*(0+\lambda)$$

Sample Assign#4.1 Key (REQ)

$A = \lambda + C1 + A0$
$B = A1 + D0 + B1$
$C = B0$
$D = C0 + D0$

$A = \lambda + C1 + A0 = \lambda + B01 + A0 = (\lambda + B01)\, 0^*$
$D = C0 + D0 = B00 + D0 = B000^*$
$B = A1 + D0 + B1 = (\lambda + B01)\, 0^*1 + B0000^* + B1 = 0^*1+B(010^*1+0000^*+1)$
$\quad = 0^*1(010^*1+0000^*+1)^*$
$C = 0^*1(010^*1+0000^*+1)^*0$
$L = 0^*1(010^*1+0000^*+1)^*\, (0 + \lambda)$

Consistent with Ripping, which does not always occur.
The Rijk version is really ugly

Assignment # 4.2

3. a.) Minimize the number of states in the following DFA, showing the determination of incompatible states (table on right).

	a	b	c
>1	2	3	5
2	5	4	4
3	2	4	5
4	5	4	2
5	5	2	4
6	5	4	2

2	2,5 X 3,4 X 4,5				
3	X	X			
4	2,5 3,4 X	√	X		
5	2,5 2,3 X 4,5	2,4	X	2,4	
6	X	X	2,5	X	X
	>1	2	3	4	5

b.) Can combine 2,4,5 and 3,6 so have states <1>, <2,4,5>, <3,6>