CS302 - Homework 2

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1) i) $(0+1)^*.1.(0+1) + (0+1)^*.1.(0+1) = (0+1)^*.1.(0+1)$

These two are the same.
We know that $A + A = A$

ii) $(((0^*.1^*)+1)^*(0+1)^*)^* = ((A+1)^*.A^*)^* = (A+1+A)^* = (A+1)^* = (0^*.1^*+1)^* = (0^*.1^*)^* = (0+1)^*$ //

$0^*.1^*$ already encapsulates "+1"

$(0^*.1^*)^* = A$

Law: $(L+M)^* = (L^*.M^*)^*$ — same law but from reverse

iii) $(L+M^*)^* = (L+M)^*$ because of the non-trivial law $(L+M)^* = (L^*+M^*)^*$

iv) $(L.M^*)^* = (L.M)^*$ because of the non-trivial law $(L.M)^* = (L^*.M^*)^*$ (assuming that $\epsilon \in L$, $\epsilon \in M$)

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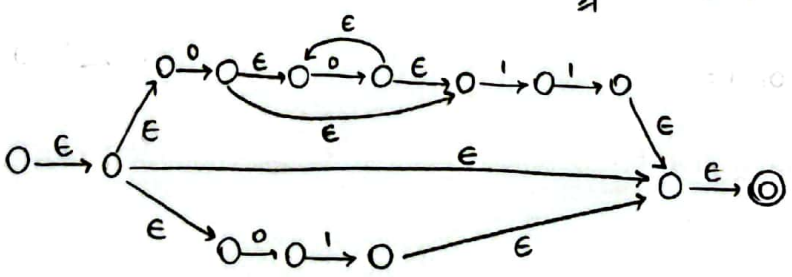
2) $((0.0^*.(1.1)) + 0.1)^*$

$0.0^*.(1.1)$



0.1

3)

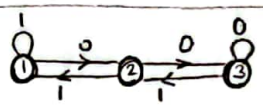
3.1.1 b) $(1+0)^*.1.\underbrace{(1+0).(1+0)....(1+0)}_{9 \text{ times}}$

c) $(0+10)^*.11.(0+10)^* + (0+10)^*$

3.1.4 b) $\underbrace{(0^*.1^*)^*}_{(0+1)^*}000(0+1)^*$ ⇒ there must be three consecutive 0's as a substring (beginning, middle or end.)

c) $(0+10)^*.1^*$ ⇒ no consecutive 1's until the end.

3.2.1 c)



$R_{11}^2 = 1^*.(01)^*$ $R_{21}^2 = 1^*$ $R_{31}^2 =$

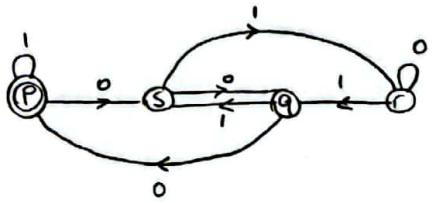
$R_{12}^2 = 1^*.(01)^*.0$ $R_{22}^2 =$ $R_{32}^2 =$

$R_{13}^2 = 1^*(01)^*.00$ $R_{23}^2 =$ $R_{33}^2 =$

→ (ε : empty string, ∅ : phi (null))

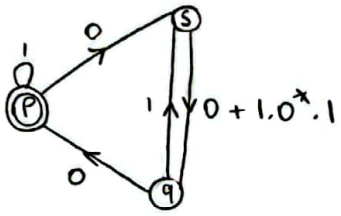
d) $(1^* + 0.0.1.1)^*.0.0.0^*$

3.2.3

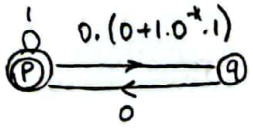


We should eliminate all the states except the initial and the final state.

1) Eliminate r



2) Eliminate s



3) Eliminate q

$1 + 0.(0+1.0^*.1).0$

⇒ RE: $(1 + 0(0+1.0^*.1).0)^*$