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Convert the DFA to a GNFA in the appropriate form.

B129 K SACHIN NAIK SVNIT has left the meeting

B106 PARIL SVNIT

B079 MIHIR GANDHI SV...

Dr. Balu L. Parne SVNIT

B109 CH ADITHYA SVNIT

B096 SNEHARSH BELSA...

B110 Krishna Pandey SV...

B126 TANGUDU VIVEK S...

B094 MANAN GANDEC...

21 others

You

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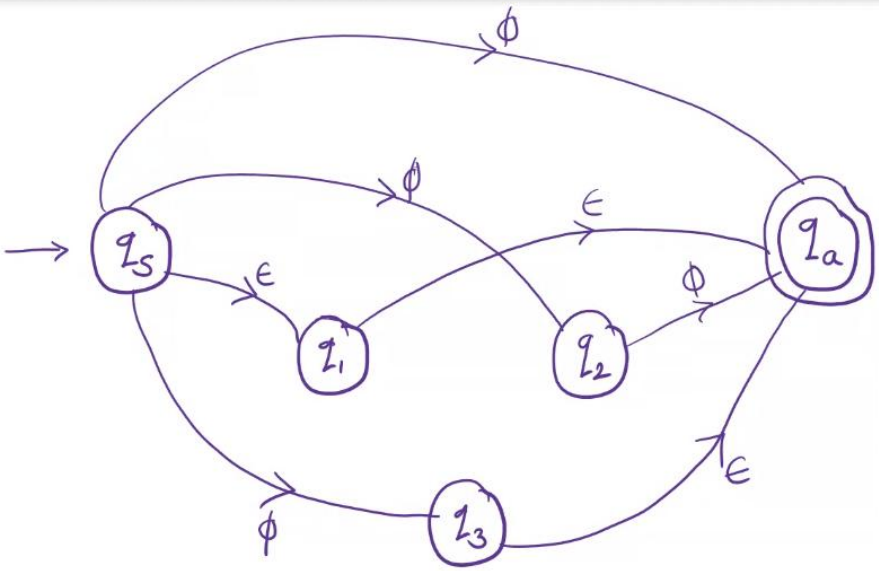

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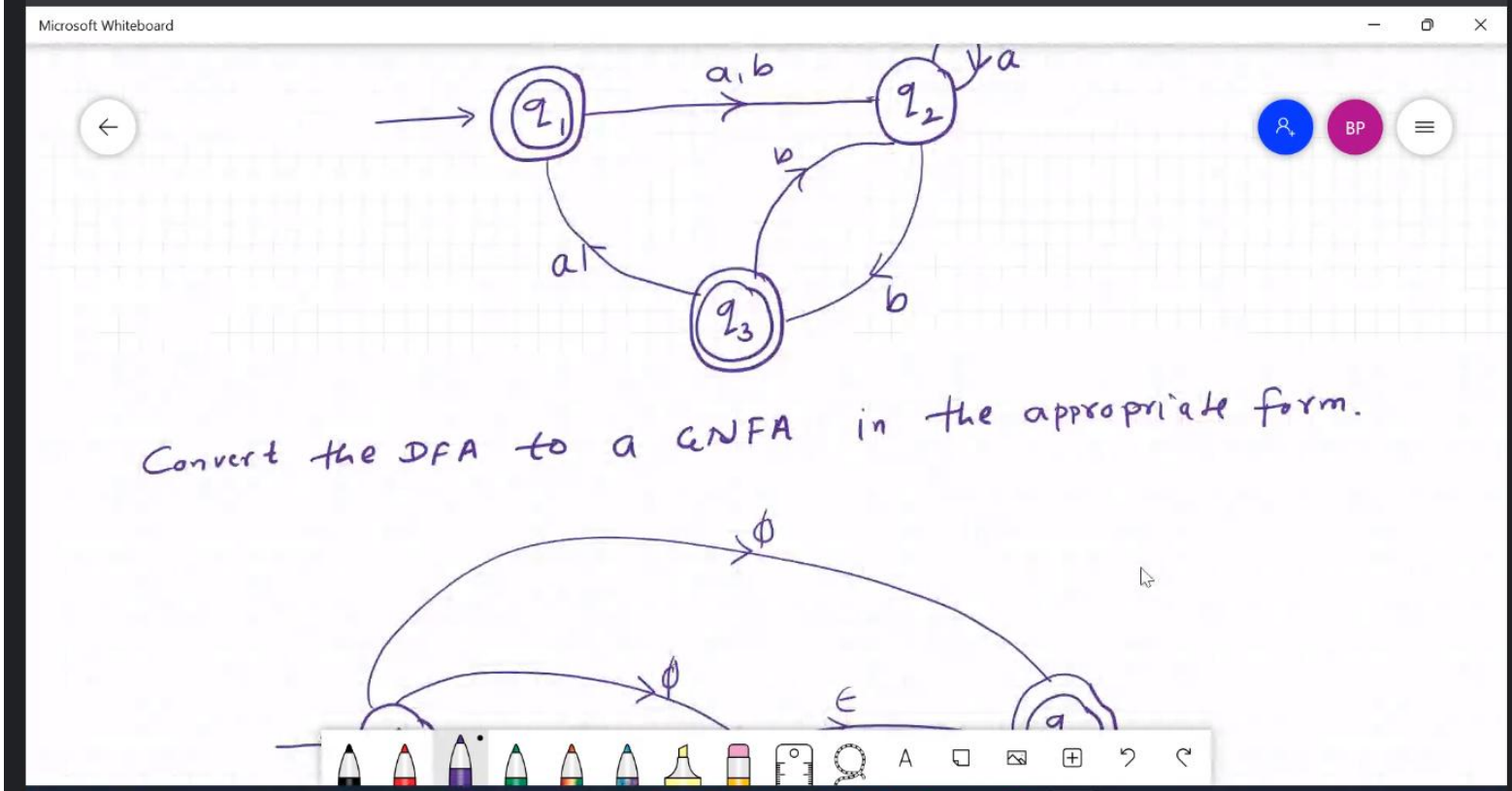

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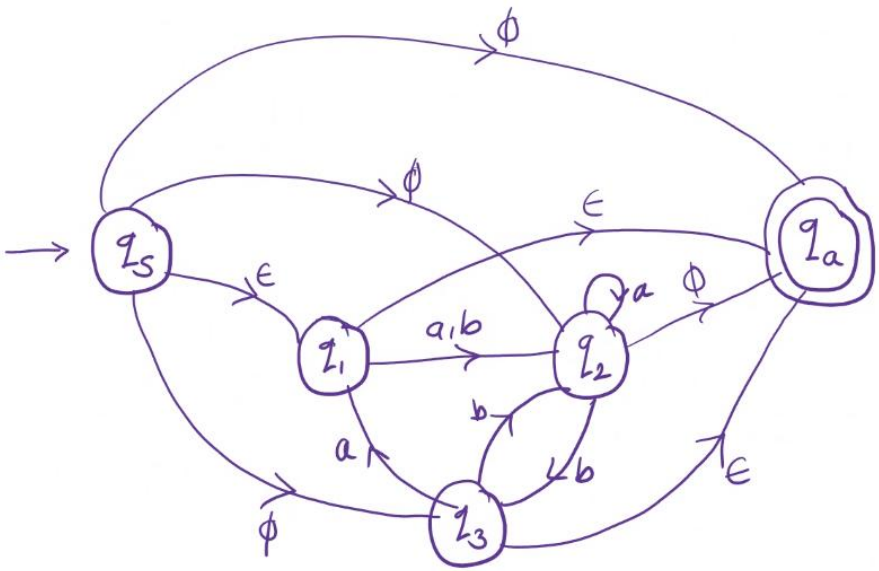

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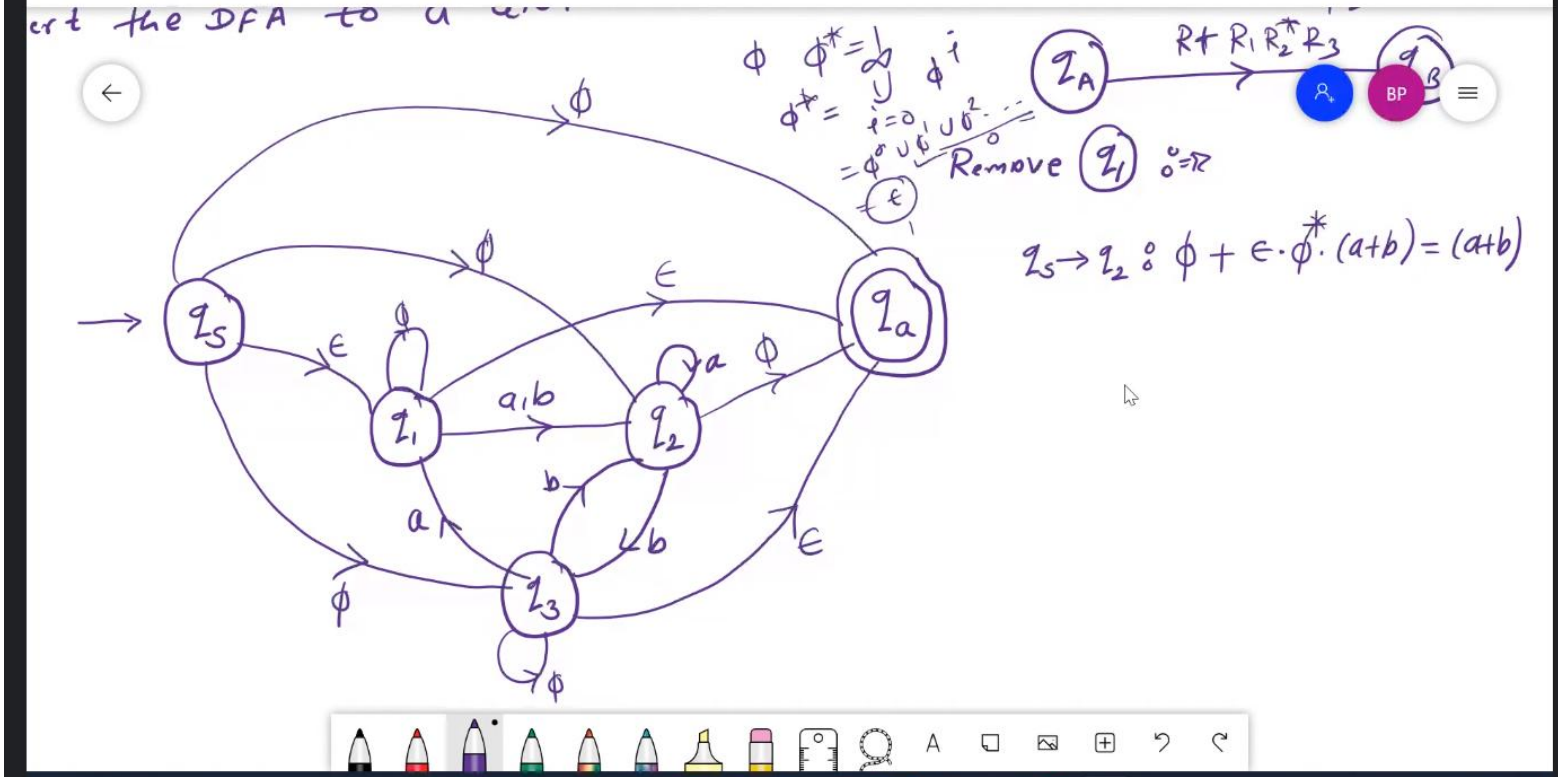

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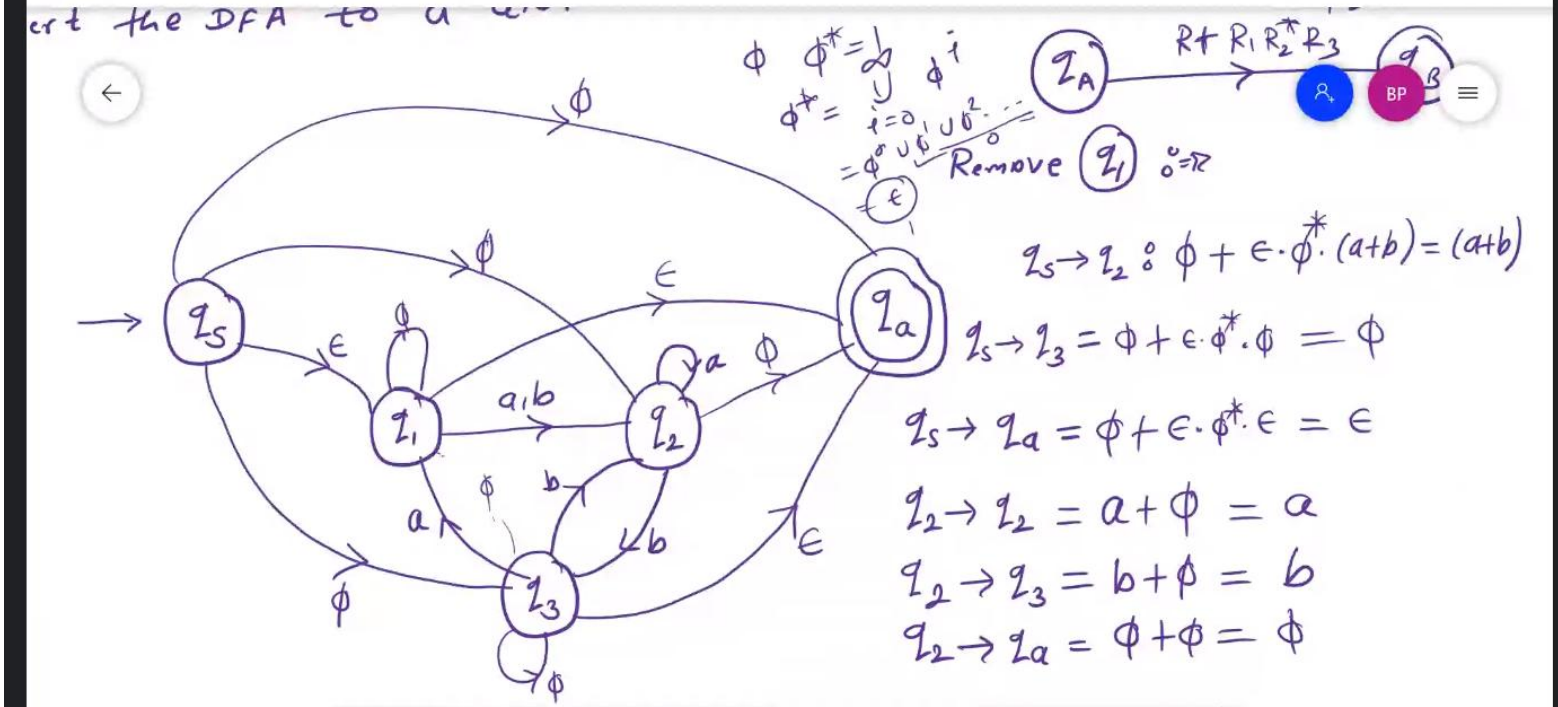

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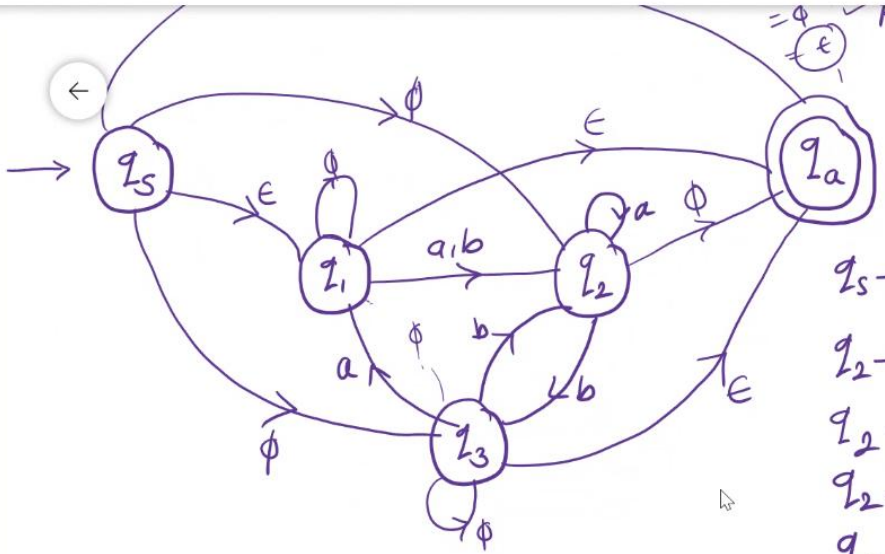

Remove q_1

$q_s \to q_2 : \phi + \epsilon \cdot \phi^* \cdot a$

$q_s \to q_3 = \phi + \epsilon \cdot \phi^* \cdot \phi = \phi$

$q_s \to q_a = \phi + \epsilon \cdot \phi^* \cdot \epsilon = \epsilon$

$q_2 \to q_2 = a + \phi = a$

$q_2 \to q_3 = b + \phi = b$

$q_2 \to q_a = \phi + \phi = \phi$

$q_3 \to q_3 = \phi + a \cdot \phi^* \cdot \phi = \phi$

$q_3 \to q_2 = b + a \cdot \phi^* \cdot (a+b) = b + a \cdot (a+b)$

$q_3 \to q_a = \epsilon + a \cdot \phi^* \cdot \epsilon = \epsilon + a$

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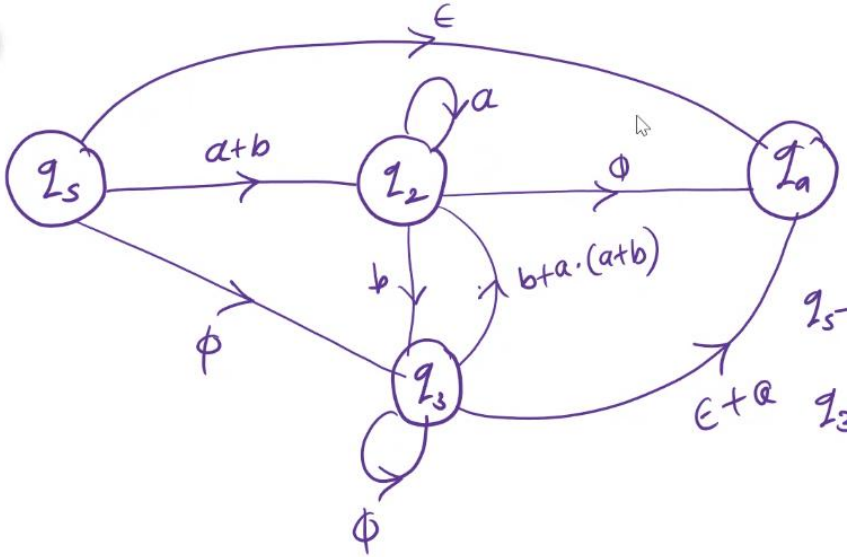

Remove q_2

$q_s \to q_a : \epsilon + (a+b)\cdot a^* \cdot \phi = \epsilon$

$q_s \to q_3 = \phi + (a+b)\cdot a^* \cdot b$

$q_3 \to q_3 = \phi + (b+a\cdot(a+b)\cdot a^* \cdot b)$

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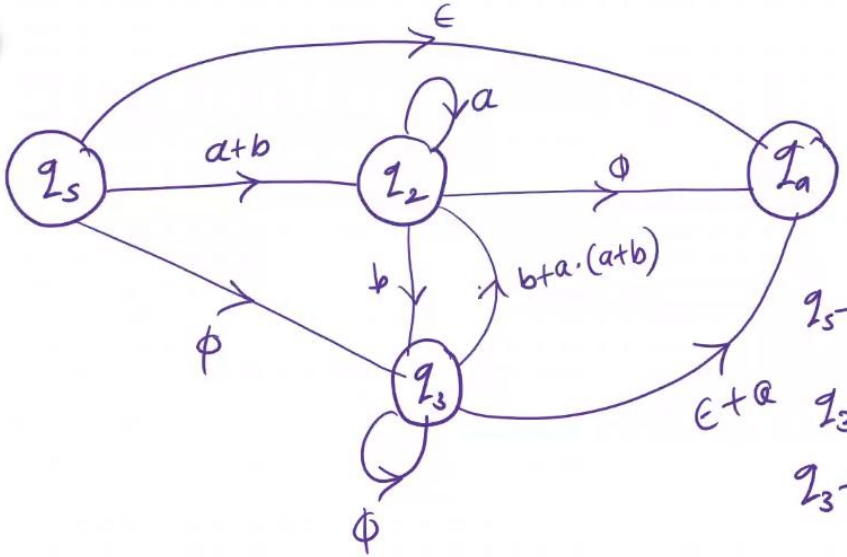

Remove q_2

$q_s \to q_a : \epsilon + (a+b)\cdot a^* \cdot \phi$
$= \epsilon$

$q_s \to q_3 = \phi + (a+b)\cdot a^* \cdot b$

$q_3 \to q_3 = \phi + (b+a\cdot(a+b)\cdot a^* \cdot b)$

$q_3 \to q_a = (\epsilon+a) + (b+a\cdot(a+b)\cdot a^* \cdot \phi)$
$= \epsilon + a$

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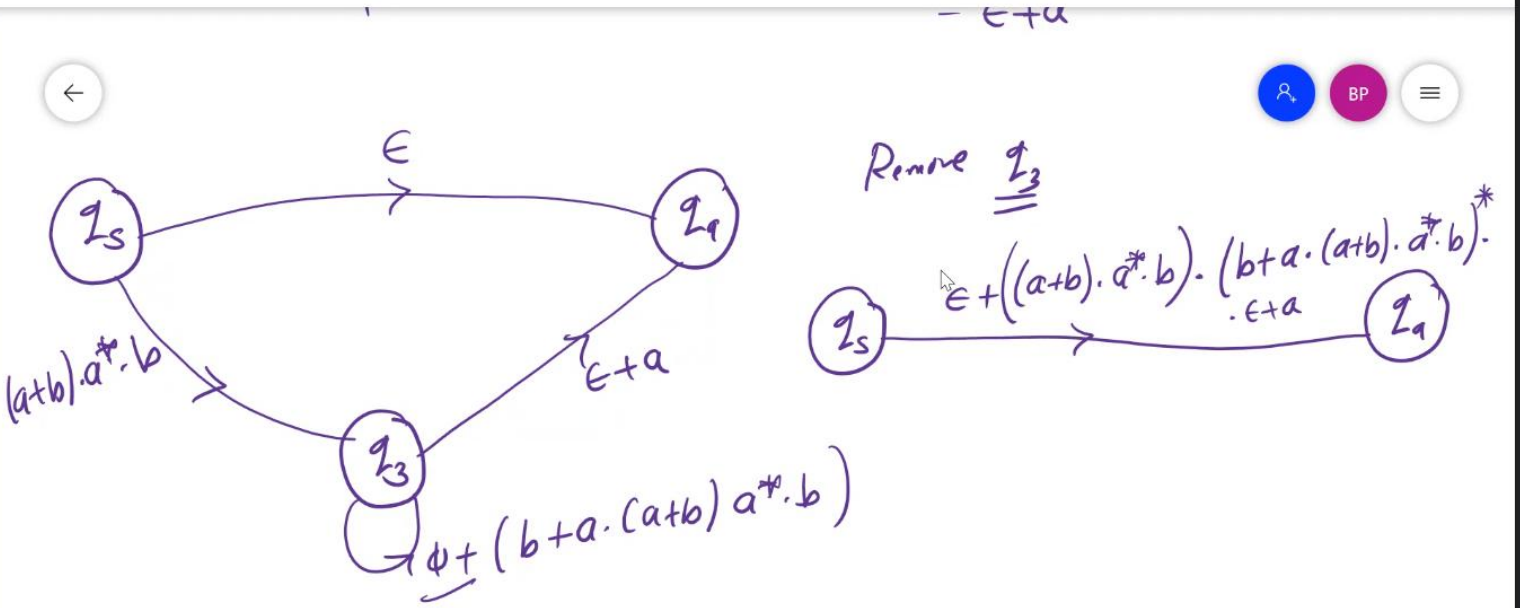

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Arden's Theorem :

If P and Q are two regular expressions over Σ and if P does not contain ϵ, then the following equation in R given by $R = Q + RP$ has a unique solution

i.e. $R = QP^*$

$R = Q + RP \Longrightarrow R = QP^*$

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i.e. $R = QP^*$

$R = Q + RP \Longrightarrow R = QP^*$

$R = Q + RP$

replace R with QP^*

$R = Q + QP^*P$

$R = Q(\epsilon + P^*P)$

Identities.

$\epsilon + R^*R = R$

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replace R with QP^*

$R = Q + QP^*P$

$R = Q(\epsilon + P^*P)$

$R = QP^*$

Identies.

$\epsilon + R^*R = R^*$

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$R = Q + RP$

replace R with $Q+RP$

$R = Q + (Q+RP)P$

$= Q + QP + RP^2$

$R = Q + QP + (Q+RP) \cdot P^2$

$= Q + Q$

B110 Krishna Pandey SVNIT has left the meeting

B106 PARIL SVNIT

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B070 YADAV JAY RAJEN...

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$R = Q + RP$

replace R with $Q+RP$

$R = Q + (Q+RP)P$

$= Q + QP + RP^2$

$\downarrow$

$R = Q + QP + (Q+RP) \cdot P^2$

$= Q + QP + QP^2 + RP^3$

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$$R = Q\left(\epsilon + P + P^2 + P^3 + \cdots P^{n} + P^{*} P^{n+1}\right)$$

$$P^{*}$$

$$R = QP^{*}$$

BP

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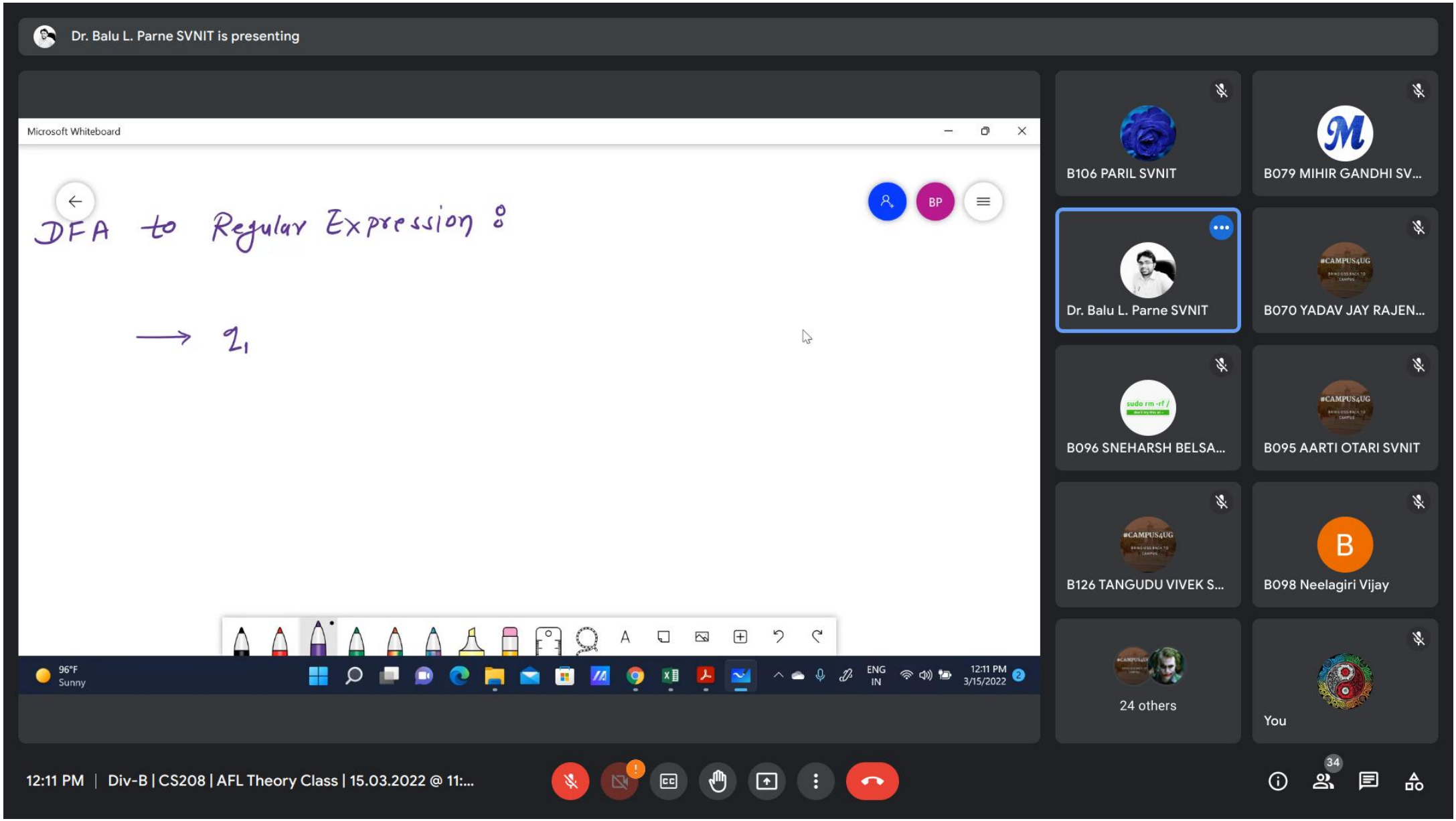
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DFA to Regular Expression :
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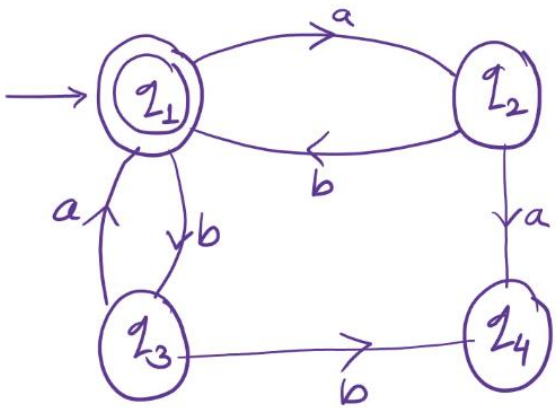

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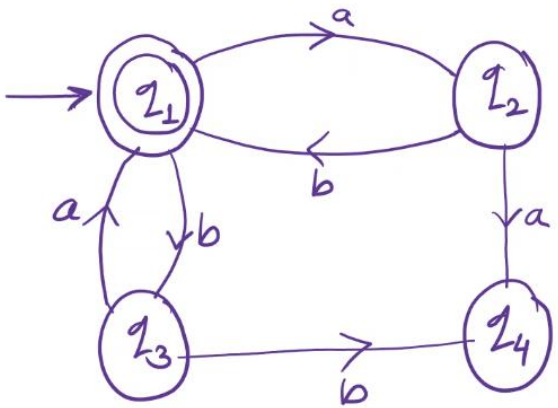

$$q_1 = \epsilon + q_2 b + q_3 a$$

$$q_2 = q_1 a$$

$$q_3 = q_1 b$$

$$q_4 = q_2 a + q_3 b$$

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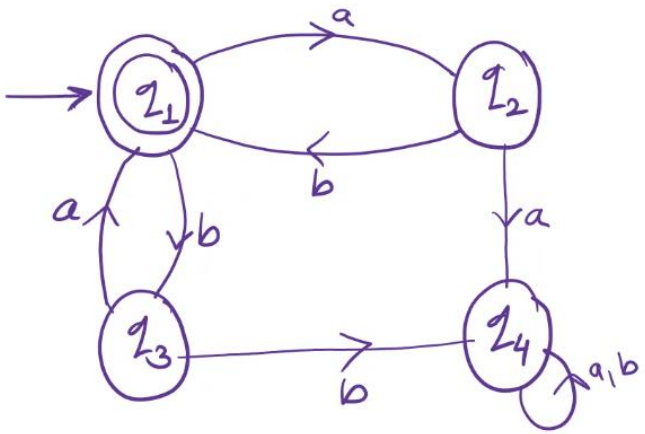

$$q_1 = \epsilon + q_2 b + q_3 a \quad \text{— I}$$

$$q_2 = q_1 a$$

$$q_3 = q_1 b$$

$$q_4 = q_2 a + q_3 b + q_4 a + q_4 b$$

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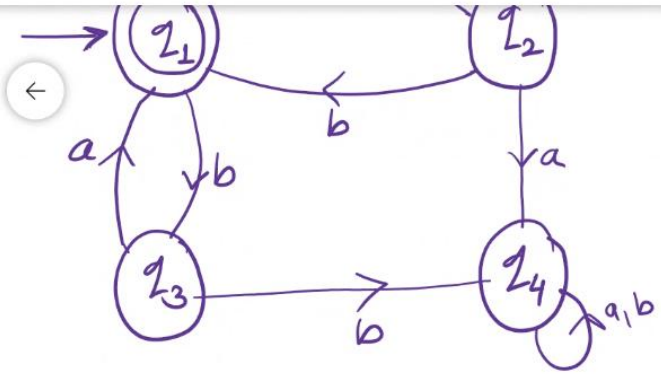

$q_2 = q_1 a$ — II

$q_3 = q_1 b$ — III

$q_4 = q_2 a + q_3 b + q_4 a + q_4 b$ — IV

$q_1 = \epsilon + q_2 b + q_3 a$

$= \epsilon + q_1 ab + q_1 ba$

$q_1 = \epsilon + q_1 (ab + ba)$

$R \quad Q \quad R \quad P$

$R = Q + RP$

$\Downarrow$

$R = QP^*$

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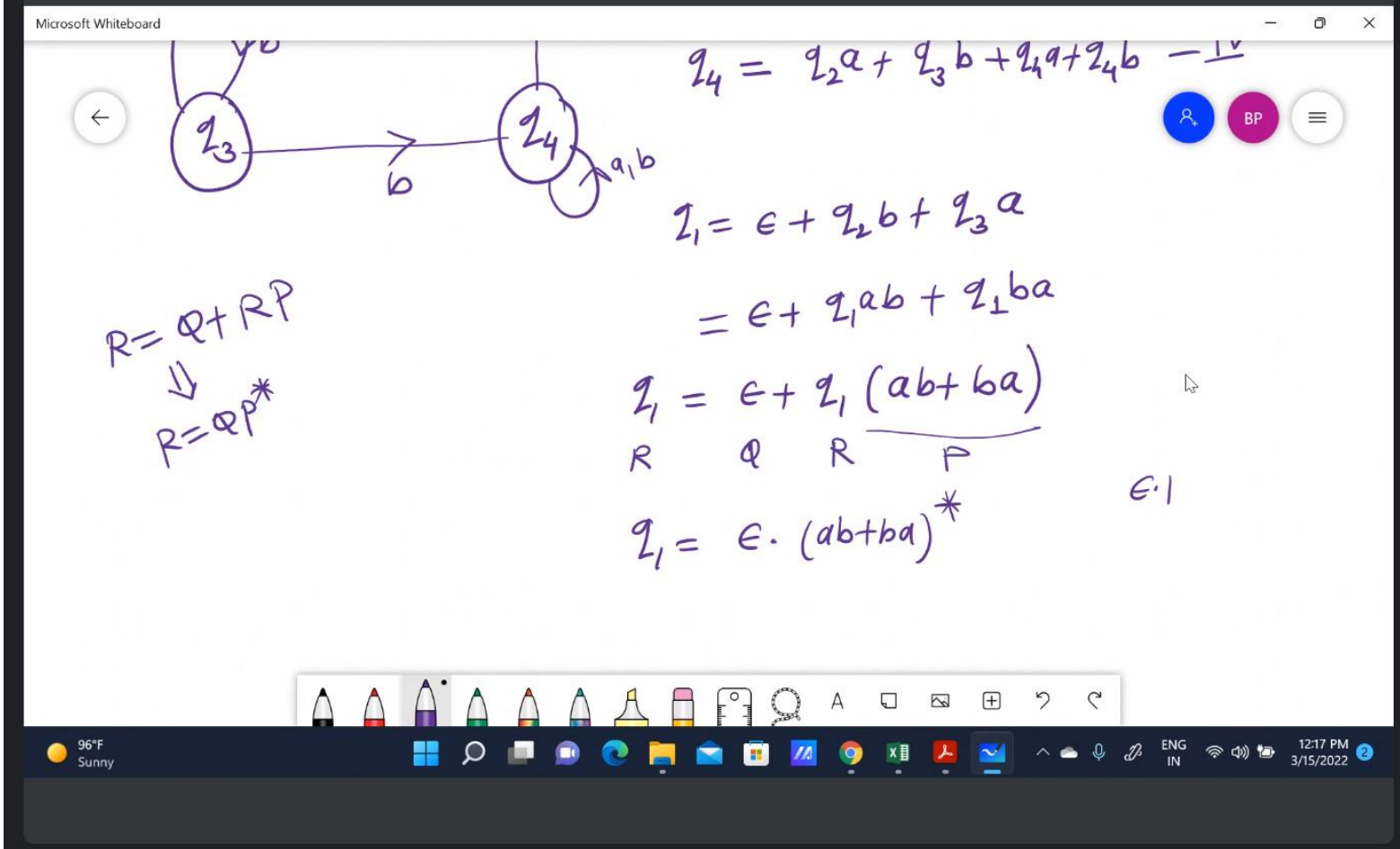

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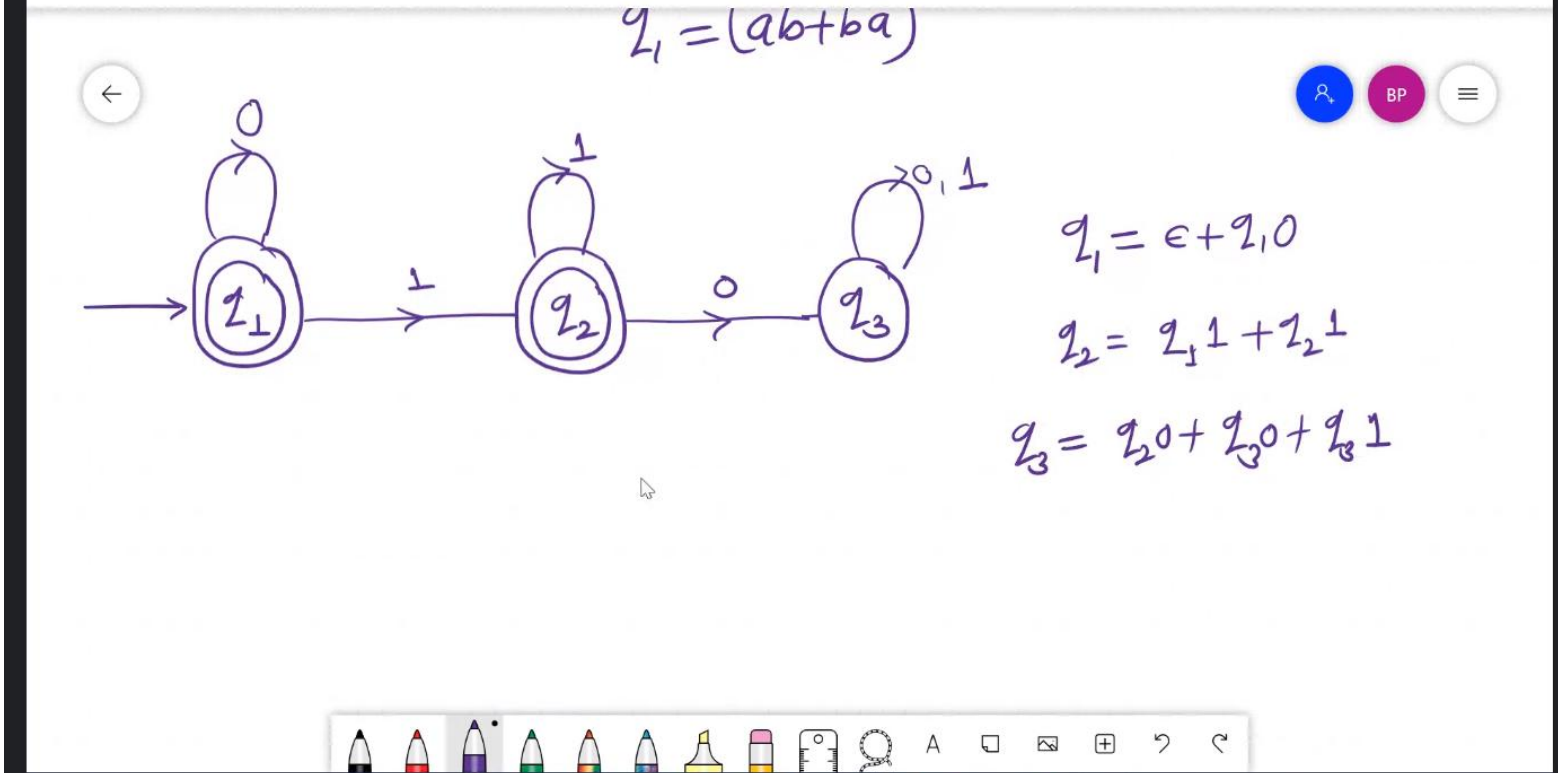

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$q_1 = \epsilon + q_1 0 = \epsilon \cdot 0^* = 0^*$

R Q + RP

$q_2 = q_1 1 + q_2 1 = 0^* 1 + q_2 1 = 0^* 1\ 1^*$

$q_3 = q_2 0 + q_3 0 +$

R.E. $= 0^*$

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$q_1 = \epsilon + q_1 0 = \epsilon \cdot 0^* = 0^*$

$R \quad Q + RP$

$q_3 = q_2 0 + q_3 0 +$

$q_2 = q_1 1 + q_2 1 = 0^* 1 + q_2 1 = 0^* 1 1^*$

$R.E. = 0^* + 0^* 1 1^*$

$= 0^* (\epsilon + 1 1^*)$

$\epsilon + RR^* = R^*$

$R.E. = 0^* 1^*$

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