Regular Expression $\{a,b\}$

1) Create RE for Any no of a's & b's

$(a+b)^* = \{\wedge, a, b, ab, ba, aab, aaa - - - \}$

2) String length Exactly 2 $\{a, b\}$

Regular set = $\{aa, ab, ba, bb\}$

$aa + ab + ba + bb$

$a(a+b) + b(a+b)$

$(a+b)(a+b) \Rightarrow RE$ ✓

3) String length Exactly 1

R.S = {a, b}

RE ⇒ (a+b) = 1

String length = 2 → (a+b)(a+b) → 2

4) String length Exactly 3

→ (a+b)(a+b)(a+b)

5) String length atleast 2

$\{aa, ab, ba, bb, aaa, aab, baa, bbb - -\}$

$(a+b)(a+b)$ $(a+b)^*$

length 2

↓

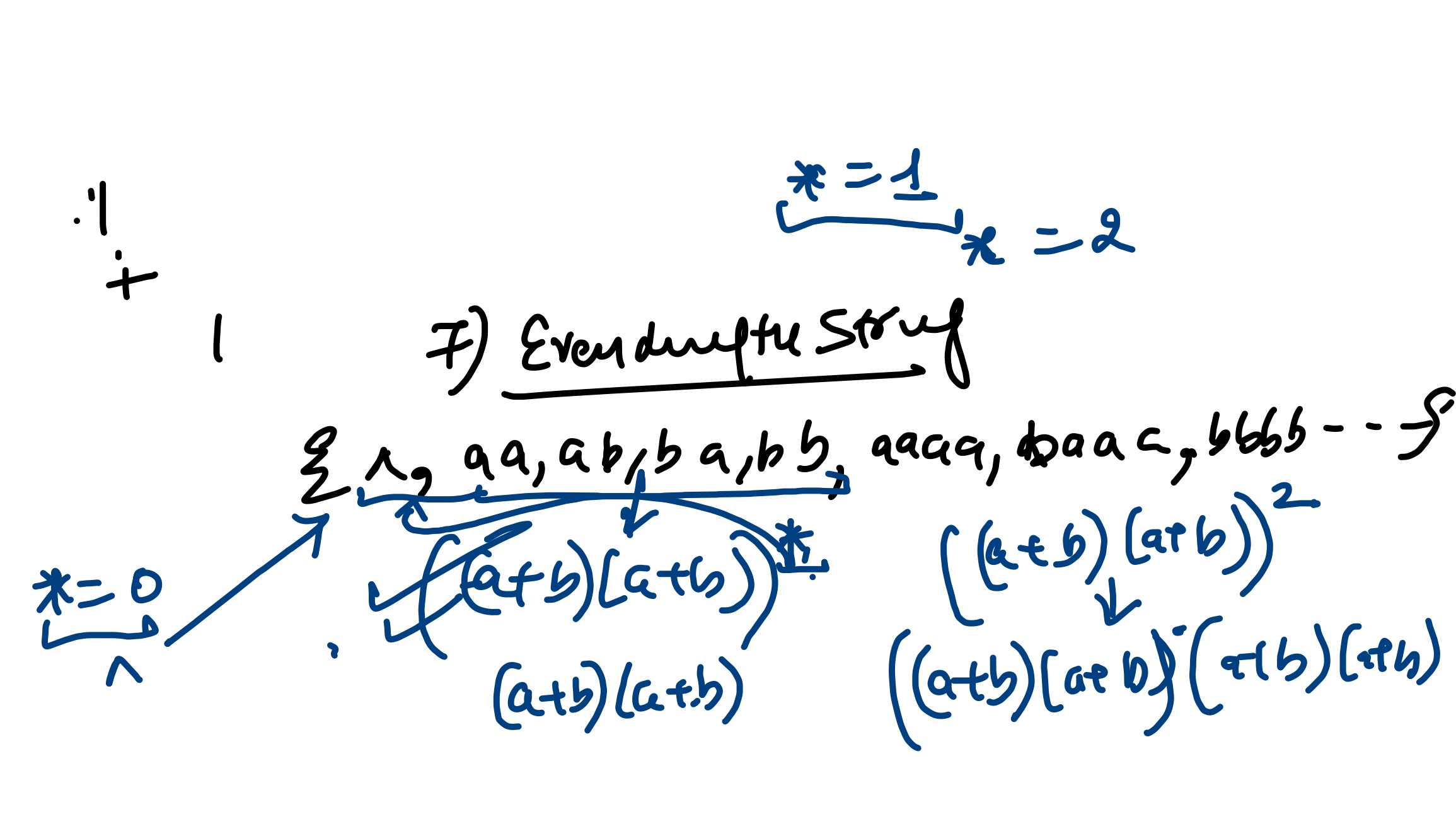
Any no of a's & b's

6) Strings of length atmost 2

R-S $\{\wedge, a, b, aa, ab, ba, bb\}$

RE → $\wedge + a + b + aa + ab + ba + bb$

$\wedge + (a+b) + (a+b)(a+b)$


*=1
*=2
7) Even length Strings
Σ ^, aa, ab, ba, bb, aaaa, abaa, baab, bbbb - - -
*=0
^
(a+b)(a+b)
*
(a+b)(a+b)
(a+b)(a+b)
(a+b)(a+b)

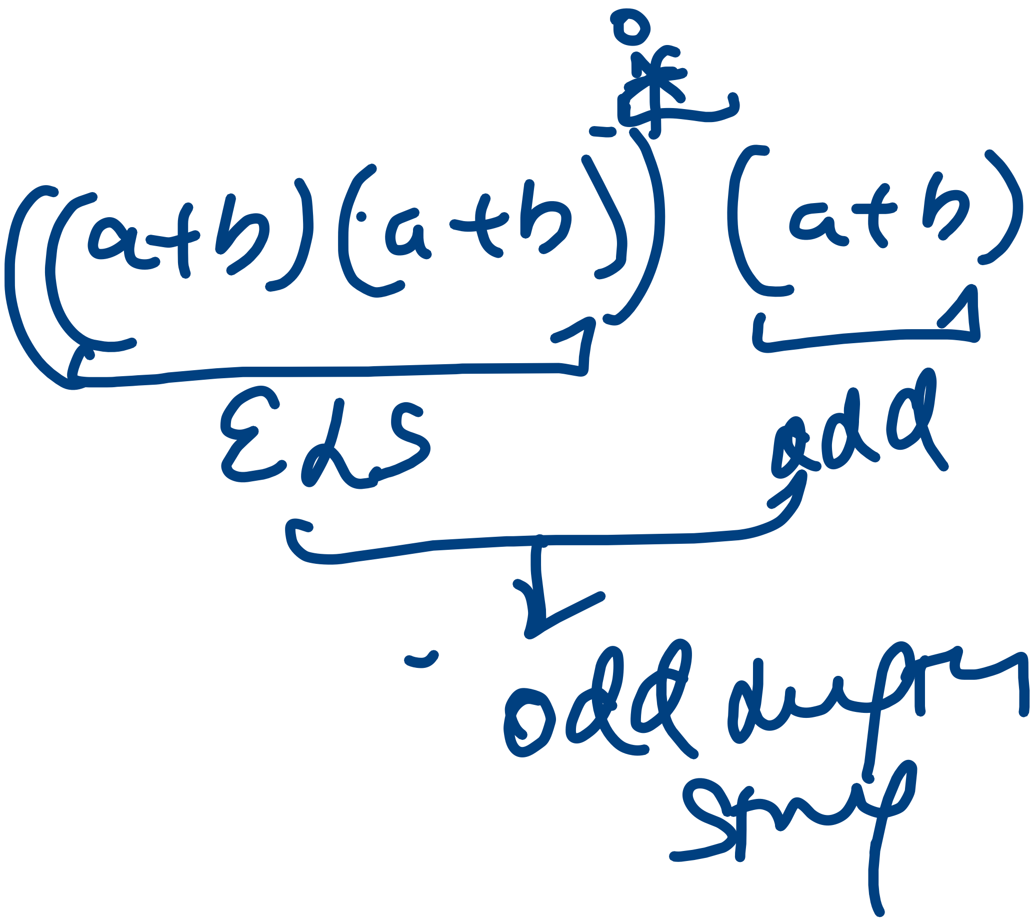
8) Odd length string

$\{a, b, aaa, abb, aab, baa, bbb, \ldots\}$

$(\underbrace{(a+b)(a+b)}_{\text{Even-S}})(a+b)$

$(aa + ab + ba + bb)(a+b)$

$= aaa + abb + baa + bba + aab + abb + bab + bbb$



$a(a+b)$

$(a+b)$

$(a+b)(a+b)^{*}(a+b)$

q. length is divisible by 3 → {Λ, 3, 6, 9 -- -- -}

Answer → $((a+b)(a+b)(a+b))^*$ * = 2

$((a+b)(a+b)(a+b))((a+b)(a+b)(a+b))$

10. length $\equiv 2 \bmod 3$

Divide by 3, Remainder $\equiv$ 2 length string

$((a+b)(a+b)(a+b))^*(a+b)(a+b)$

$(a+b)(a+b)$ → length $= 2$

11) Starts with ab 13)

$ab(a+b)^*$

12) Ends with ba

$(a+b)^* ba$

(3) Starts & Ends with different symbol

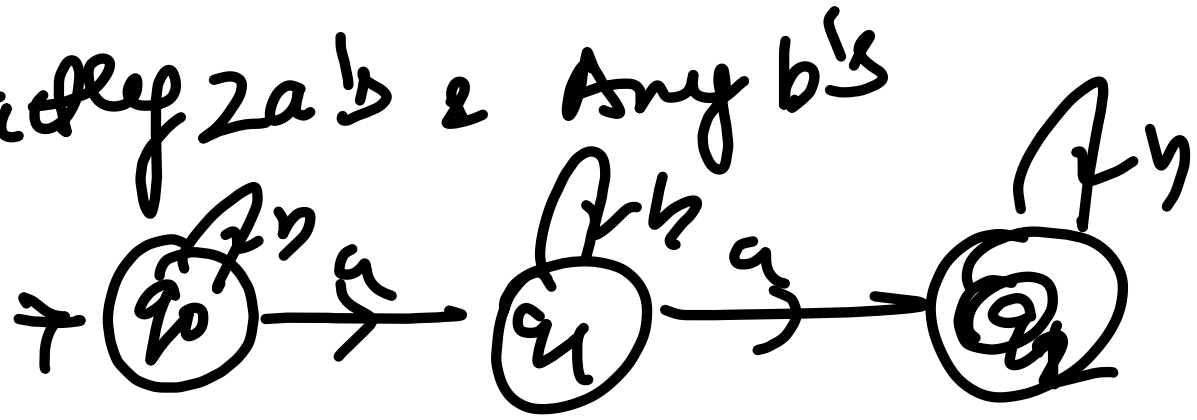
a b , b a

$a(a+b)^* b + b(a+b)^* a$] Ans

14) Starts & Ends with same symbol

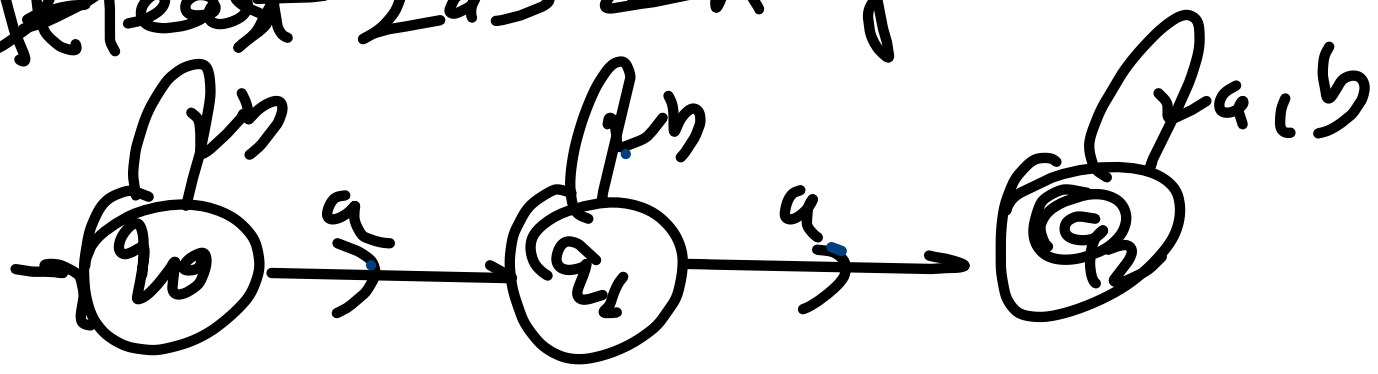
$a(a+b)^*a + b(a+b)^*b + a + b + \wedge$

(5) Exactly 2 a's & Any b's



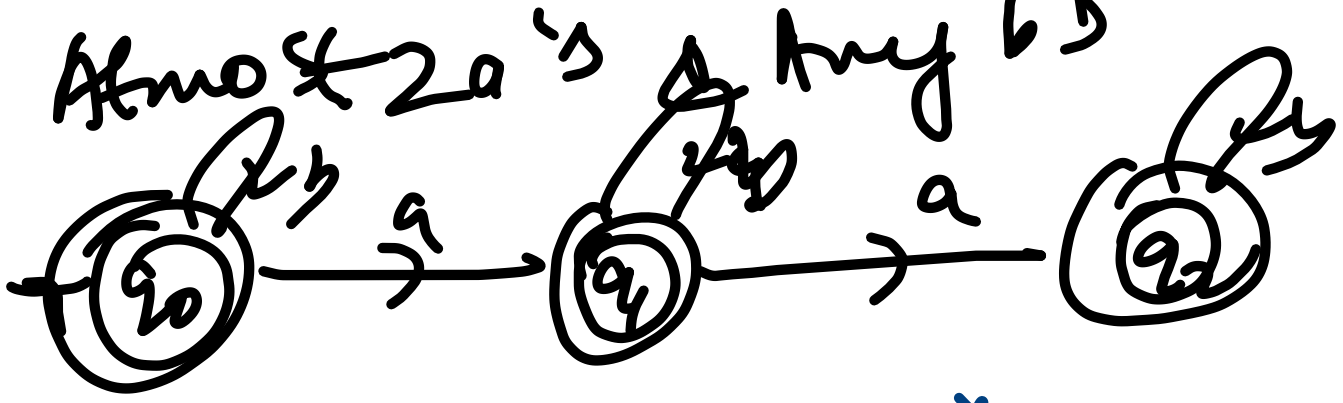
$b^* a\, b^* a\, b^*$

16) Atleast 2 a's and Any b's



$b^* a b^* a (a+b)^*$

(7) Atmost 2a's & Any b's



$b^* a b^* \; a b^* + b^* a b^* + b^*$

Many a's | 1a's | 0 a's

∴ Answer