CSC 220

11/5/2020

R.E.

Properties of R.E:

- $R + T = T + R$
- $R + \phi = \phi + R = R$
- $R \cdot \phi = \phi \cdot R = \phi$
- $\phi^* = \lambda$
- $R \cdot \lambda = \lambda \cdot R = R$
- $(R + S) + T = R + (S + T)$
- $R + R = R$
- $R(S + T) = RS + RT$
- $\lambda^* = \lambda$

- 1.0^* : a 1 followed by any # of 0's. (including no zero)

$n=0$ $\quad 1.0^0 = 1.\lambda = 1$

$n=1$ $\quad 1.0 = 1.0$

$n=2$ $\quad 100$

$n=3$ $\quad 1000$

⋮

- $(10)^*$: any # of copies of 10

- $0 \cup 01$
- $0(0+1)$
- $(00)^*$
- $(0+1)^*$

- $0 \cup 01$ is not RE

- $(0+1)$ means 0 or 1

$$L(0+1) = \{0, 1\}$$

- $0(0+1)$

$$L(0(0+1)) = L(00+01) = L(00) \cup L(01)$$

$$= \{00\} \cup \{01\}$$

$$= \{00, 01\}$$

. $(00)^*$

$n=0$ $\quad (00)^0 = \lambda$

$n=1$ $\quad 00$

$n=2$ $\quad 0000$

$n=3$ $\quad 000000$

$$L(00)^* = \{\lambda, \underset{2}{00}, \underset{4}{0000}, \underset{6}{0\ldots0}, \underset{8}{0\text{—}0}, \ldots\}$$

$$= \{0^m \mid m = 2k, k \in \mathbb{N}\}$$

All made of zero with even length.

$(0+1)^*$:

$L(0+1)^*$: all possible strings made of 0 and 1.

- All strings made of zero, odd length?

L? $\lambda \in L$?

$0 \in L$?

$00 \in$? 000? 01?

$L = \{0, 000, 00000, \ldots\}$
$\quad\quad 1 \quad 3 \quad 5$

0.0^* AS

$$L(0\,0^*) = L(0) \cdot L(0^*)$$

$$= \{0\} \cdot \{\lambda, 0, 00, 000, \ldots\}$$

$$= \{0, 00, 000, 0000, \ldots\}$$

$0(00)^*$?

$$L(0) \cdot L(00)^* = \{0\} \cdot \{\underset{0}{\lambda}, \underset{2}{00}, \underset{4}{0000}, \underset{6}{000000}, \ldots\}$$

$$= \{\underset{1}{0}, \underset{3}{000}, \underset{5}{00000}, \underset{7}{0000000}, \ldots\}$$

. All bitstrings $\longrightarrow A = \{0, 1\}$

. All bitstrings $(0+1)^*$

. All bitstrings except empty string?

$0 + (0+1)^* + 1$??

$(0+1) \cdot (0+1)^*$

↓

if $\lambda \longrightarrow 0$ or 1

. All bitstrings ending with at least one 1.

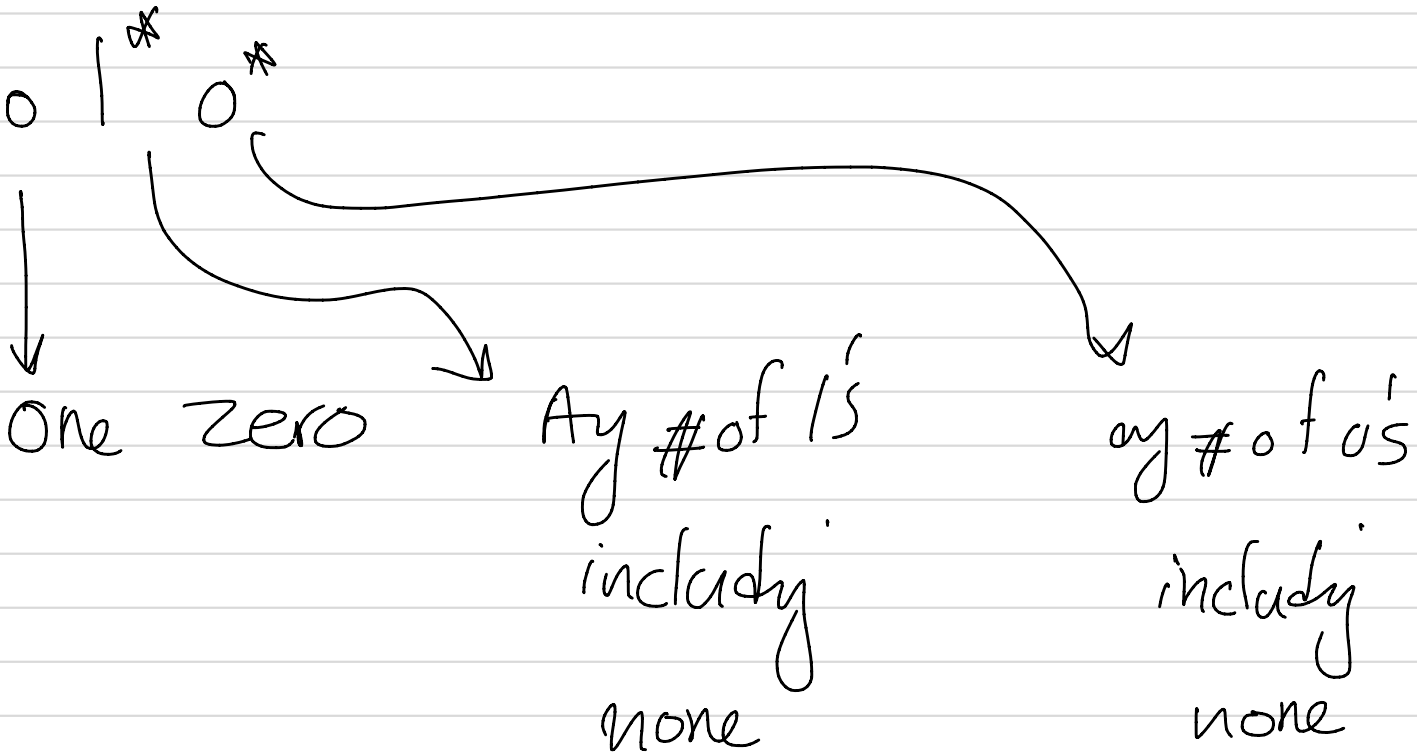
$(0+1)^* \cdot 1$

Determine whether 0101 belongs to each of these RE:

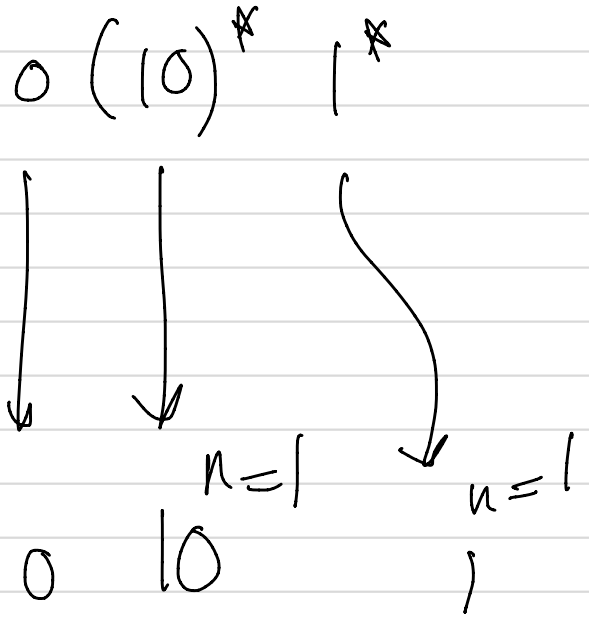
01^*0^*

$0((10)^*1^*$

$0(11)^*(01)^*$



"010" is not in here



$0101 \in L$

$0(11)^* (01)^*$

$0\lambda \quad 01 \quad X$

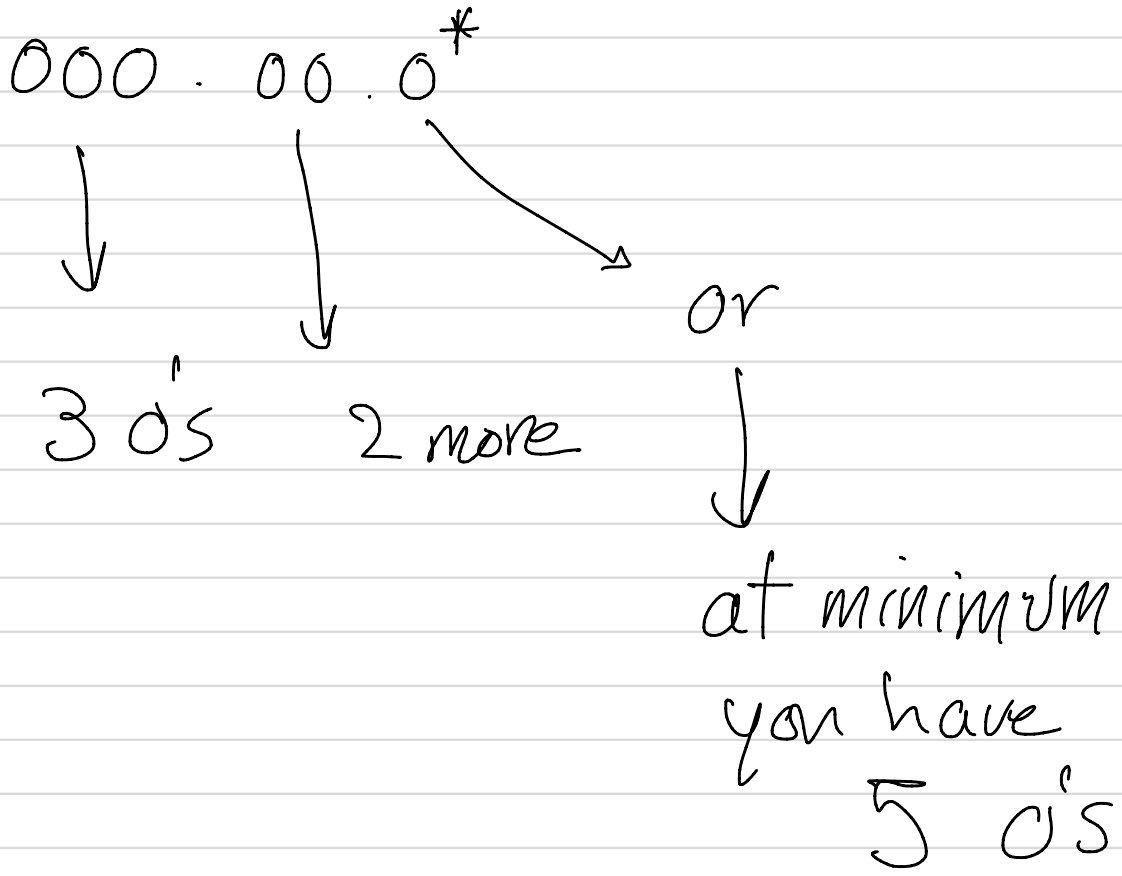
$0\lambda \quad 0101 \quad X$

$0R$

$011 \quad \lambda \quad X$

$0101 \notin L$

. RE: strings of 3 0's followed by 2 or more 0's?


000 . 00 . 0*
3 0's
2 more
or
at minimum
you have
5 0's.