1)

a)

$E \rightarrow T \rightarrow F \rightarrow a$

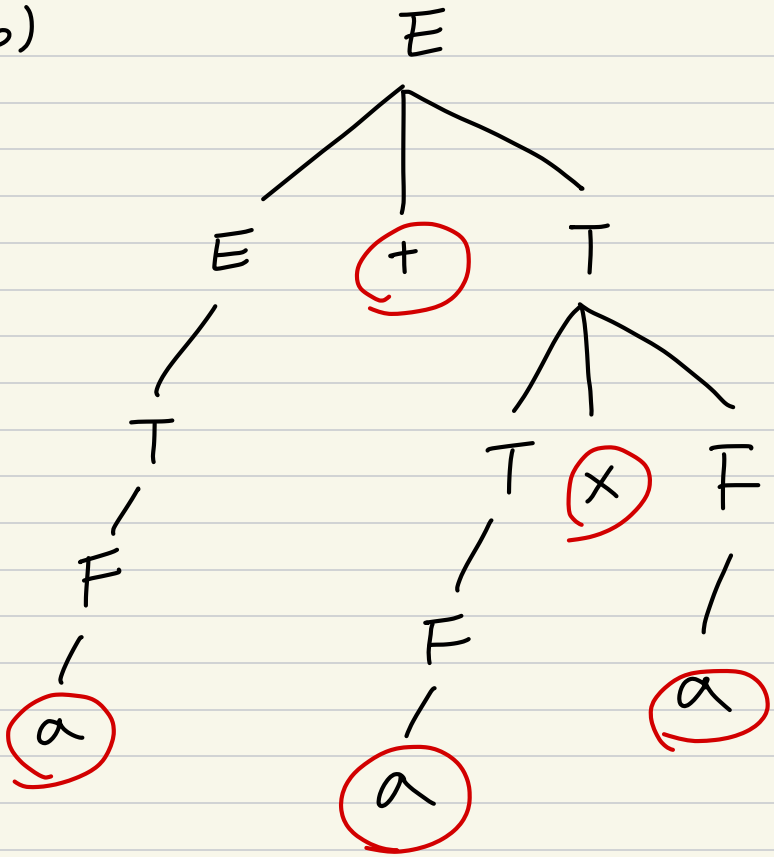
$E \rightarrow E+T \rightarrow T+F \rightarrow F+a$

$\rightarrow a+a$

$E \rightarrow T \rightarrow F \rightarrow (E) \rightarrow (T) \rightarrow (F)$

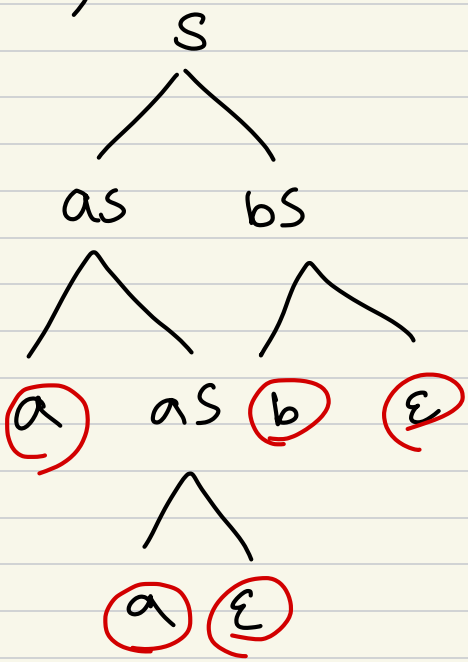
$\rightarrow (a)$

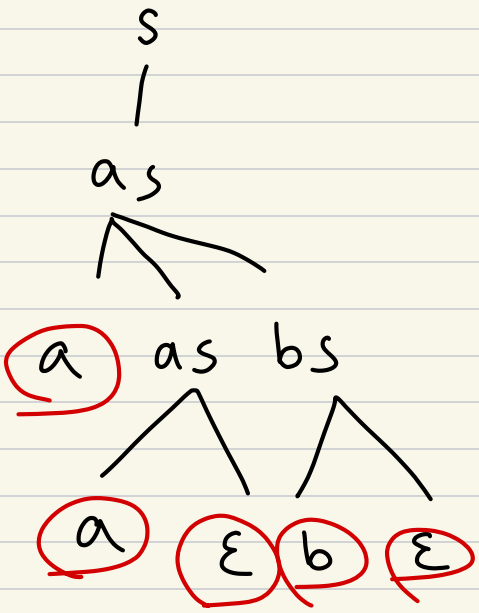
b)



a + a x a

2)





a a ε b ε

= aab

a a ε b ε

= aab

3) $L1 = \Sigma^* | \Sigma^* | \Sigma^* | \Sigma^*$

$S \rightarrow A | A | A | A |$

$A \rightarrow 0A | 1A | \varepsilon$

$L2 = \Sigma(\Sigma\Sigma)^*$

$S \rightarrow AW$

$W \rightarrow 11W | 10W | 01W | 00W | \varepsilon$

$A \rightarrow 0 | 1$

$L3 = \{ w \mid$ length of w is odd and the middle symbol is $1 \}$

$S \rightarrow 1$

$S \rightarrow 0W10W \mid 0W11W \mid 1W10W \mid 1W11W$

$W \rightarrow 0W \mid 1W \mid \varepsilon$