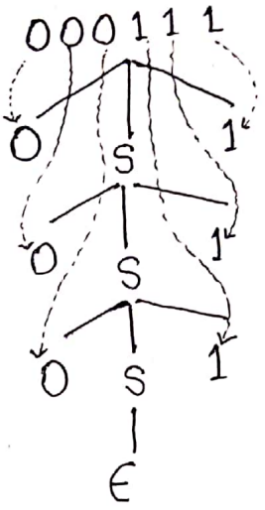
CFG

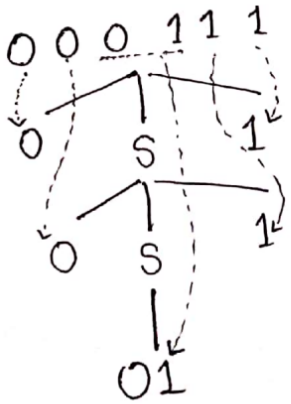
Q: $L = \{\omega \in \{0,1\}^* : \omega = 0^m 1^n, \text{ where } m = n, m \geq 0\}$

$$S \rightarrow 0S1 \mid \epsilon$$



Q: $L = \{\omega \in \{0,1\}^* : \omega = 0^m 1^n, \text{ where } m = n, m \geq 1\}$

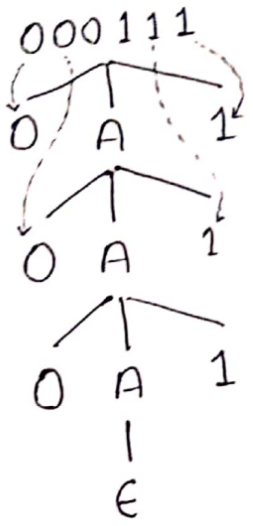
$$S \rightarrow 0S1 \mid 01$$



$S \rightarrow 0S1 \longrightarrow 00S11 \rightarrow 000111$

Another Approach:

$$S \rightarrow 0A1$$
$$A \rightarrow 0A1 \mid \epsilon$$

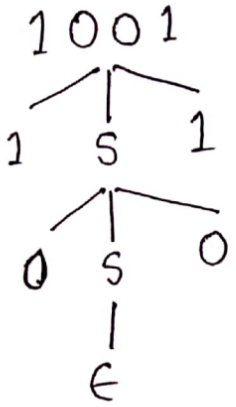


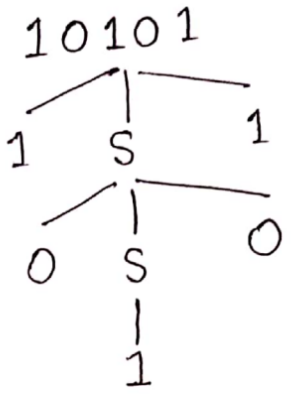
Practice:

$L = \{\omega \in \{0,1\}^* : \omega = 0^m 1^n, \text{ where } m > n \text{ and } m > 0\}$

Q: $L = \{\omega \in \{0,1\}^* : \omega \text{ is a valid palindrome.}\}$

$$S \longrightarrow 0S0 \mid 1S1 \mid 0 \mid 1 \mid \epsilon$$





Q: $L = \{\omega \in \{0,1\}^* : \omega \text{ is a even length palindrome.}\}$

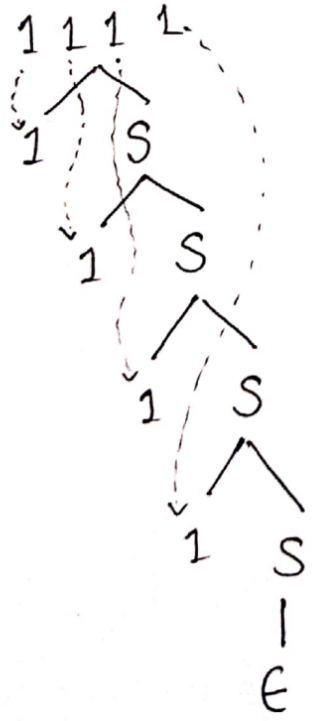
$$S \longrightarrow 0S0 \mid 1S1 \mid \epsilon$$

Practice:

Q: $L = \{ \omega \in \{0,1\}^* : \omega$ is a odd length palindrome. $\}$

Q: $L = \{ \omega \in \{0,1\}^* : \omega = 1^n$, where $n \geq 0 \}$

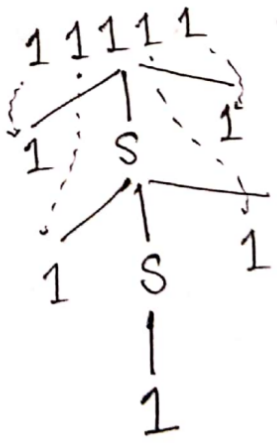
$S \rightarrow 1S \mid \epsilon$



Another approach:

$S \rightarrow 1S1 \mid 1 \mid \epsilon$ ⟶ for odd length

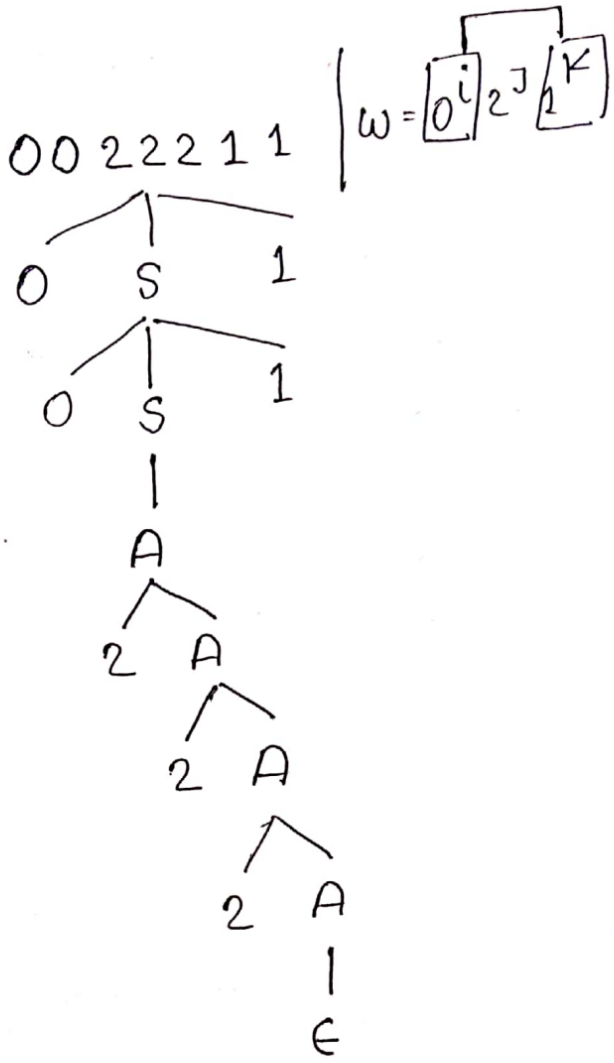
⟶ for even length

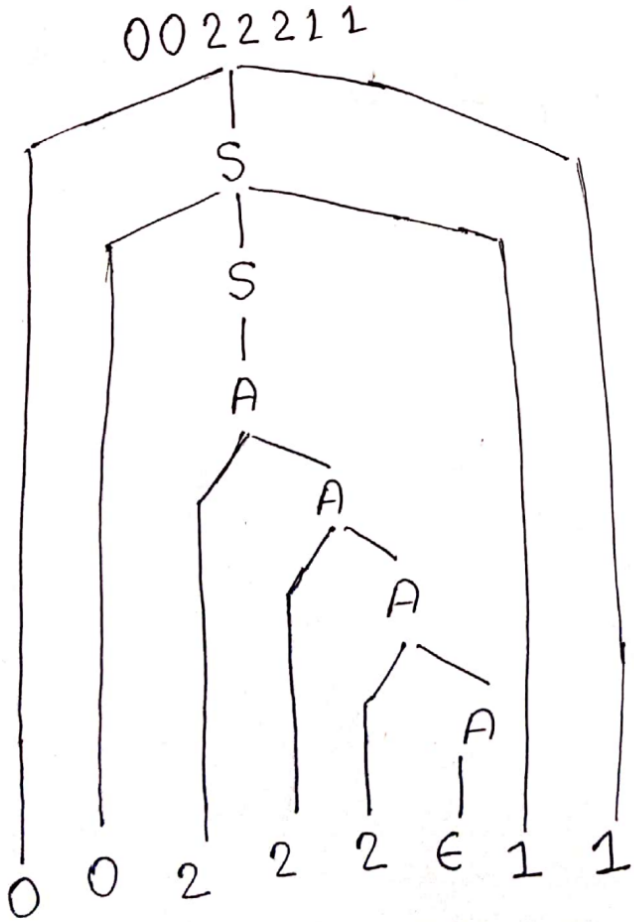


Q: $L = \{\omega \in \{0,1\}^* : \omega = 0^i 2^j 1^k$; where $i = k$ and $i, j, k \geq 0\}$

$S \longrightarrow 0S1 \mid A$

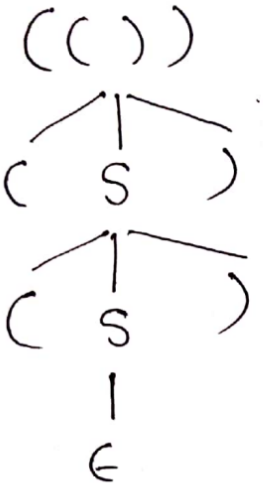
$A \longrightarrow 2A \mid \epsilon$

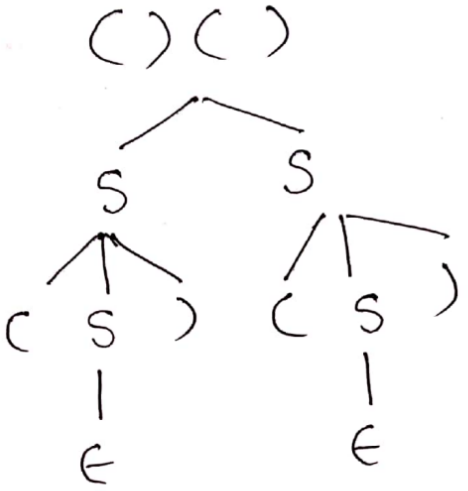




Q: $L = \{w \in \{(,)\}^* : w \text{ is a valid parentheses}\}$

$$S \rightarrow (S) \mid SS \mid \epsilon$$





Practice:

Try to draw the parse tree for the following strings using the grammer above.

1) (()()) () ()

2)