

Derivation, Parse tree, Ambiguity

Qa)

$$S \rightarrow ASB | SS | TSS | SAS | A$$

$$A \rightarrow ASS | BS | B$$

$$B \rightarrow 00 | 11 | 01 | 1$$

a) left derivation of 00010111

$$S \rightarrow \underline{S}AS$$

$$\rightarrow \underline{S}S A S$$

$$\rightarrow \underline{A}S A S$$

$$\rightarrow \underline{B}S A S$$

$$\rightarrow 00\underline{S} A S$$

$$\rightarrow 00\underline{A} A S$$

$$\rightarrow 00\underline{B} A S$$

$$\rightarrow 0001\underline{A} S$$

$$\rightarrow 0001\underline{B} S$$

$$\rightarrow 000101\underline{S}$$

$$\rightarrow 000101\underline{A}$$

$$\rightarrow 000101\underline{B}$$

$$\rightarrow 00010111$$

[Underlined variables were derived
in the next substitution]

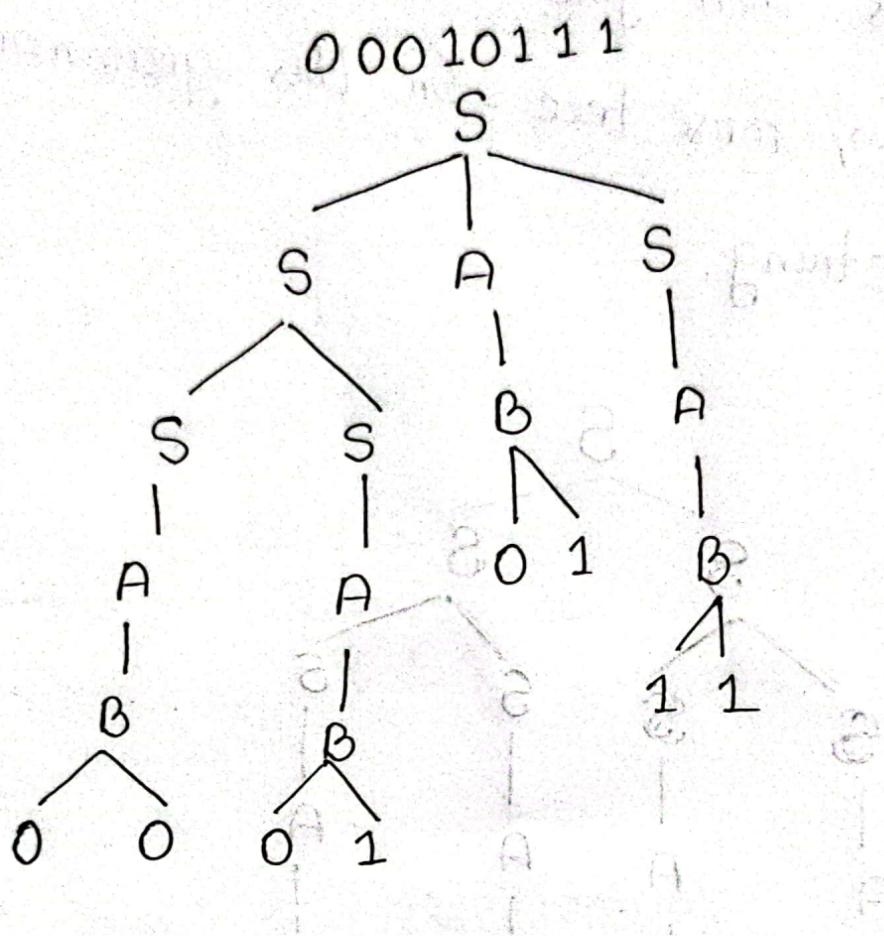
↓
No need to show in the
answer script. If you want
you may.

[Multiple derivation is
possible for this grammar
and the string]

b) right derivation for 00010111

S → SAS
→ SAA
→ SAB
→ SA 11
→ SB 11
→ S0111
→ SS0111
→ SA0111
→ SB0111
→ S010111
→ A010111
→ B010111
→ 00010111

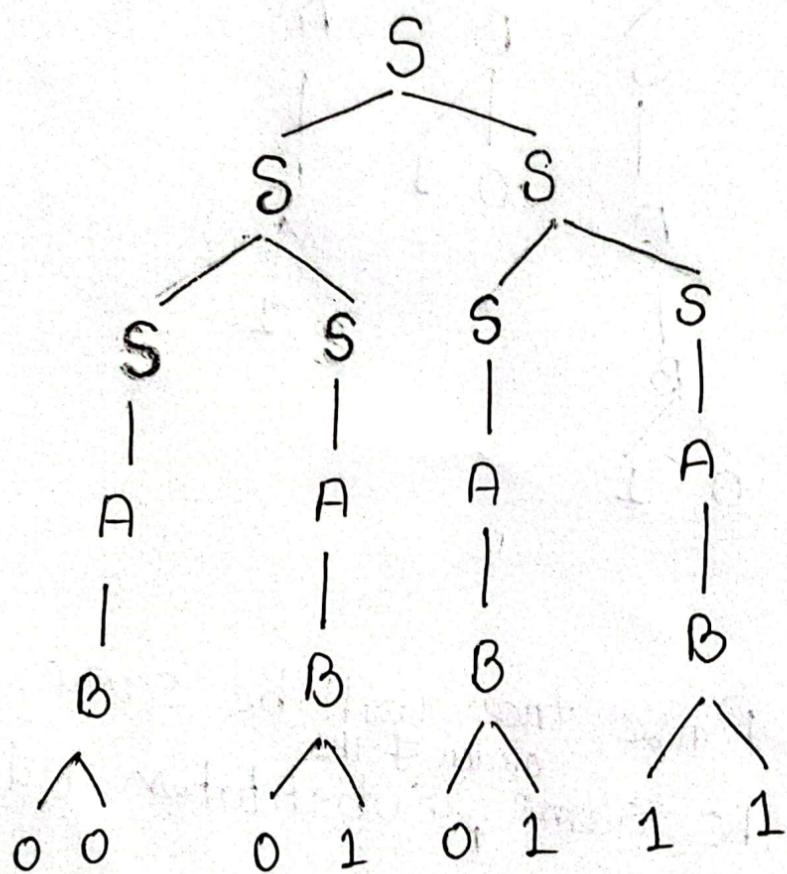
c) Parse Tree for the derivation given in (a)



d) Parse Tree for the derivation given in (b)

Same as 'c'

If you were asked to show that the Grammar is ambiguous, then you have to show another Parse tree for this grammar on left for the given string.



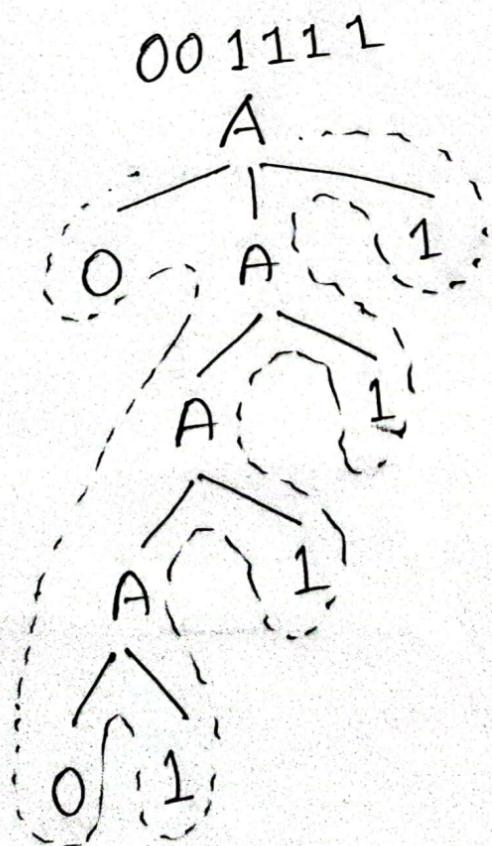
[There are multiple possible parse tree apart from this.]

Qb) $A \rightarrow A1 | 0A1 | 01$

a) leftmost derivation for 001111

$$\begin{aligned} A &\rightarrow 0A1 \\ &\rightarrow 0A11 \\ &\rightarrow 0A111 \\ &\rightarrow 001111 \end{aligned}$$

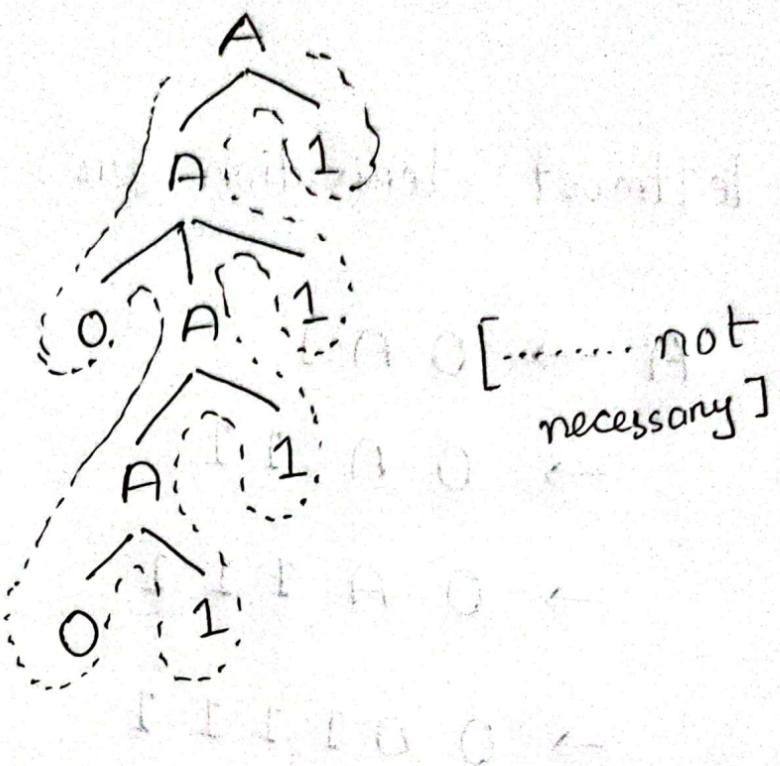
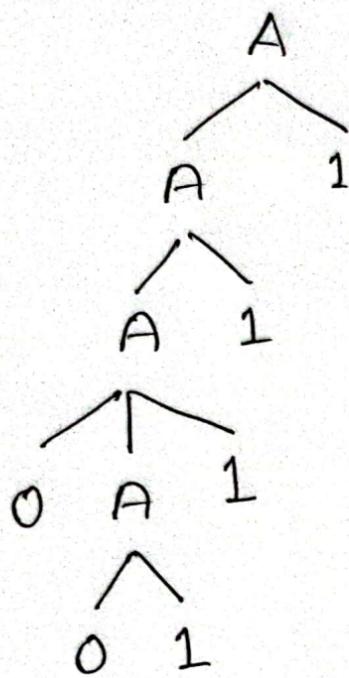
b) Parse tree for the derivation in (a):



[..... not
necessary]

[..... helps to
check if we have
parsed the given
string]

c) Two more Parse trees



d) 000111 or 011111 not sent

