

Derivation, Parse tree, Ambiguity

Qa)

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

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

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

a) left derivation of 00010111

$$S \rightarrow \underline{SAS}$$

$$\rightarrow \underline{SSA} S$$

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

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

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

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

$$\rightarrow 00 \underline{0} A S$$

$$\rightarrow 00 01 \underline{A} S$$

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

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

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

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

$$\rightarrow 00010111$$

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

$$S \longrightarrow S A \underline{S}$$

$$\longrightarrow S A A$$

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

$$\longrightarrow S A \underline{11}$$

$$\longrightarrow S B \underline{11}$$

$$\longrightarrow S \underline{0} 111$$

$$\longrightarrow S \underline{S} 0111$$

$$\longrightarrow S \underline{A} 0111$$

$$\longrightarrow S \underline{B} 0111$$

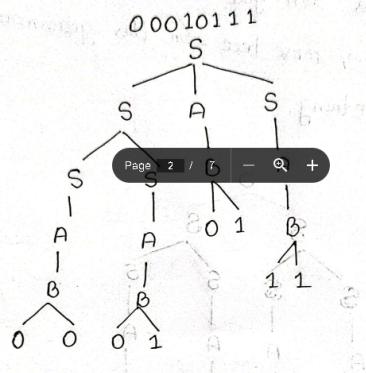
$$\longrightarrow S \underline{0} 111$$

$$\longrightarrow A 010111$$

$$\longrightarrow B 010111$$

$$\longrightarrow 00010111$$

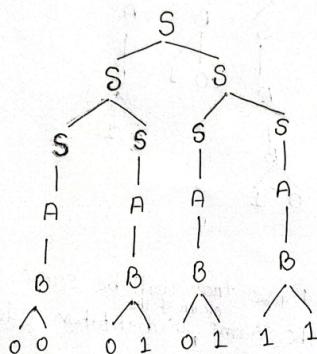
c) Parse Tree for the derivation given in (a)



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 the given string.



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

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

a) leftmost derivation for 001111

$$A \rightarrow 0 A 1$$

$\rightarrow 0 A 1 1 1$

$\rightarrow 0 0 1 1 1 1$

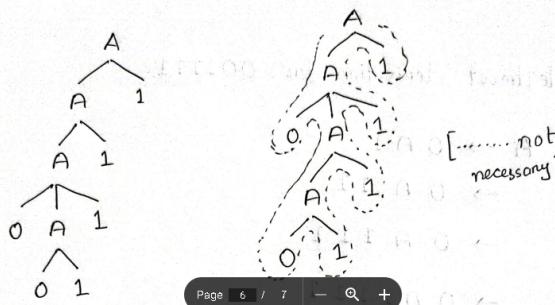
b) Parse tree for the derivation in (a):



[..... not necessary]

[..... helps to check if we have de-pended the given string]

c) Two more Parse trees

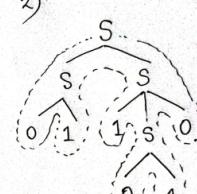
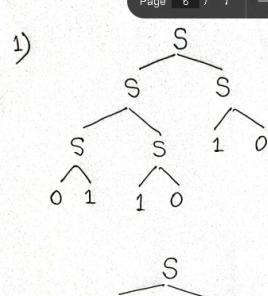


[..... not necessary]

d) 000111 or 011111 not correct

Qc) $S \rightarrow 0S1 \mid 1S0 \mid SS \mid 01 \mid 10$

a) Two different parse tree for 011010.

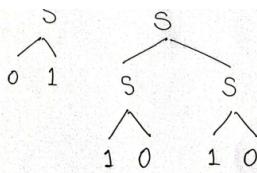


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b) 000111 or 111000 or 001110 or 011100
or 110001 or 100011.

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