

2.12)

a) The grammar can generate everything in  $\{a, b\}^*$  except  $\epsilon$ .

b)  $G \rightarrow S S S$  'abaa'

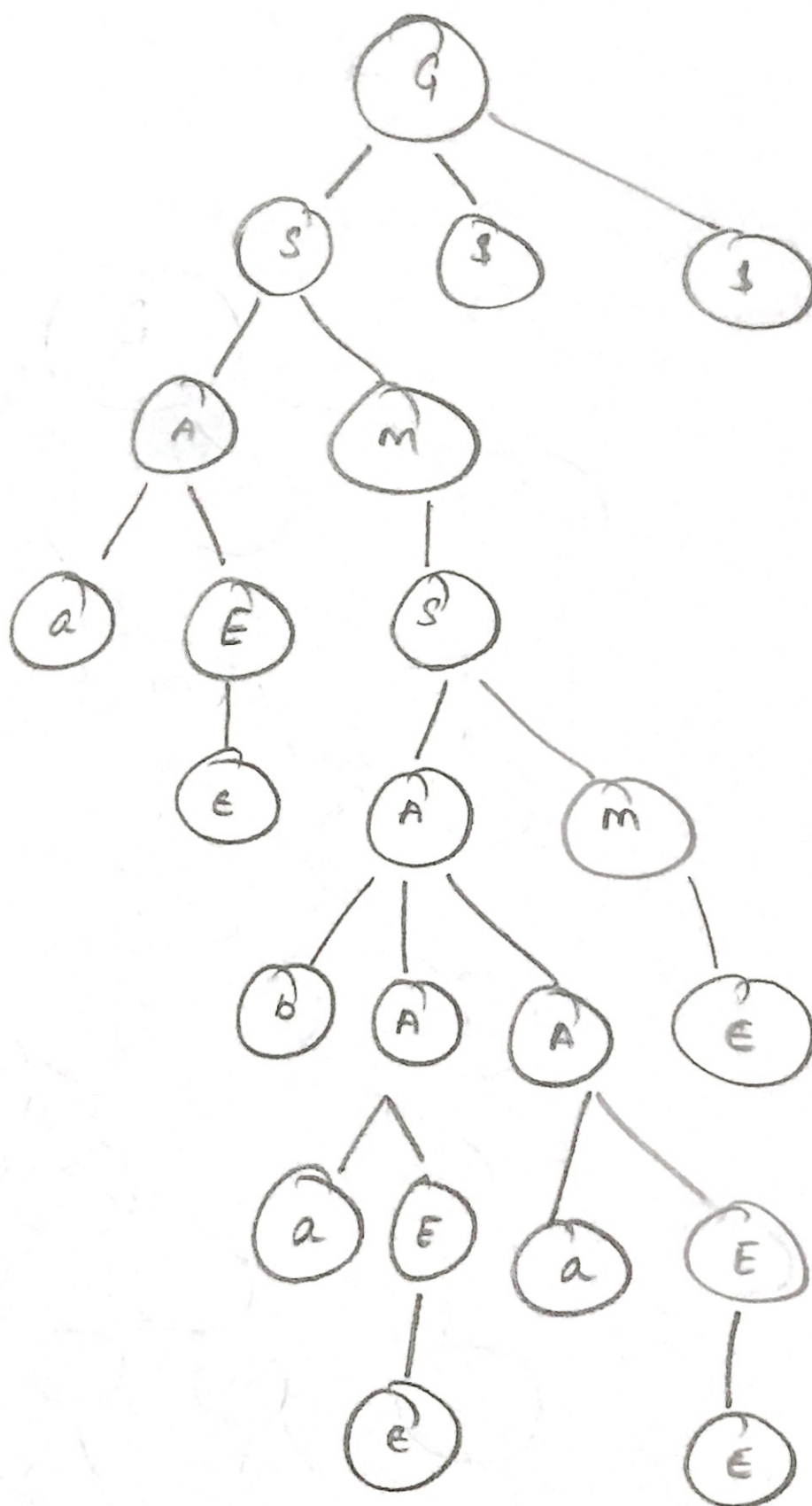
$S \rightarrow A M$

$M \rightarrow S | \epsilon$

$A \rightarrow a E | b A A$

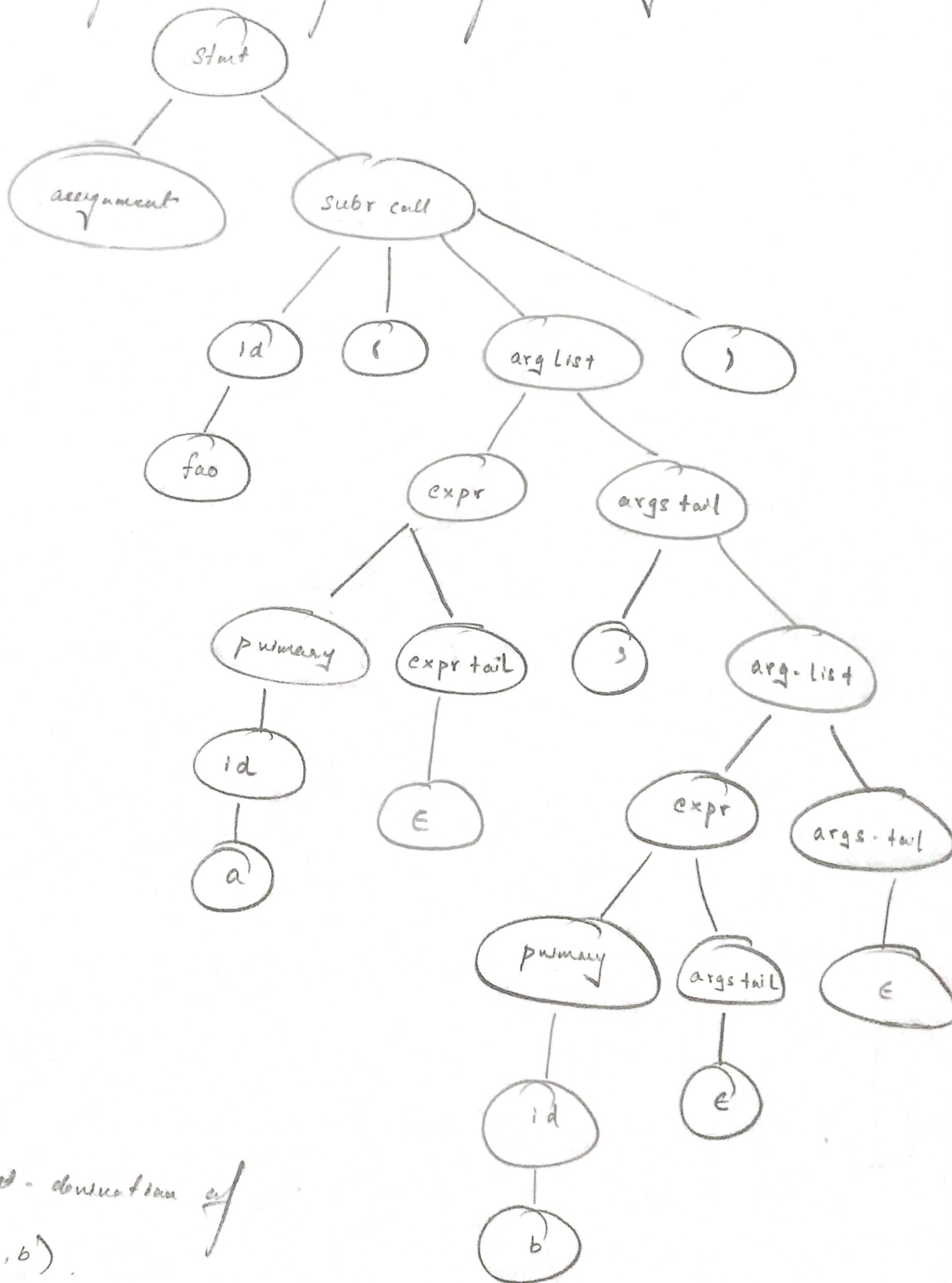
$E \rightarrow a B | b A | \epsilon$

$B \rightarrow b E | a B B$



2.13)

a) Construct a parse tree for the parse string.



Right most - derivation of  
 $foo(a,b)$ .

2)

stmt  $\rightarrow$  subr call

- $\rightarrow$  id (arg list)
- $\rightarrow$  id (expr, argstail)
- $\rightarrow$  id (expr, argslist)
- $\rightarrow$  id (expr, expr argstail)
- $\rightarrow$  id (expr, expr  $\epsilon$ )
- $\rightarrow$  id (expr, primary exptail)
- $\rightarrow$  id (expr, primary  $\epsilon$ )
- $\rightarrow$  id (expr, id)
- $\rightarrow$  id (expr, b)
- $\rightarrow$  id (primary exptail, b)
- $\rightarrow$  id (primary, b)
- $\rightarrow$  id (id, b)
- $\rightarrow$  id (a, b)
- $\rightarrow$  foo (a, b)

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2.17

stmt  $\longrightarrow$  A id comp-op id expr

comp-op  $\longrightarrow$  ==

comp-op  $\longrightarrow$  >

comp-op  $\longrightarrow$  <

comp-op  $\longrightarrow$  <=

comp-op  $\longrightarrow$  >=

comp-op  $\longrightarrow$  !=

A  $\longrightarrow$  'if' | 'while'