198:415 Spring 1999
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Quiz on Grammars
2/15/99

The following grammar describes two binary operations on strings, % and $. % is concantenation; "abc" % "def" evaluates to "abcdef". $ reverses its first operand and then concatenates it onto the end of its second operand. "abc" $ "def" evaluates to "defcba".

$ has higher precedence than %.

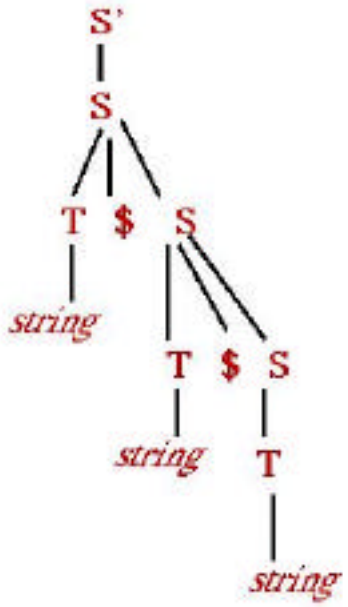
S' → S
S → T $ S | T % S | T
T → ***string*** **(where** ***string*** **tokens are alphabetic symbols surrounded by double quotes.)**

a. **What is the value of the following expression:**
   "xyz" $ "hij" % "abc" ? hijzyxabc

b. **Show a rightmost derivation of the sentence "a" % "b" % "c".**

   S' → S →T % S → T % T % S → T % T % T
   → T % T % ***string*** **→ T %** ***string % string***
   → ***string % string % string***

c. Show the parse tree for the sentence “a” $ “b” $ “c”.



d. **Change the grammar so that it is clear from the structure of the grammar that $ has higher precedence than %. Make sure your changed grammar generates the same strings as the original grammar does.**

S' → S
S → E % S | E
E → T $ E | T
T → ***string*** **(where** ***string*** **tokens are alphabetic symbols surrounded by double quotes.)**

e. **Is $ left associative or right associative?** **Right associative**