

ASSIGNMENT 2 (OPTIONAL) 11/1/2017

This assignment may be done in lieu of the original assignment
(or in addition to the original assignment for bonus points)

- (a) For the Following Context Free Grammar for generating Palindromes, build a string generator by recursing only thrice for rules that have recursion. (HINT: The two recursion rules for S when applied thrice as shown in the last two example derivations give rise to $2*2*2 = 8$ combinations. Each of the three times, there are only two possible rules to choose from. Do not use more than three levels of recursion: do not exceed (applied thrice) 8 + (applied twice) 4 + (applied once) 2 = 13 combinations of recursion). Use a systematic (combinatorial) procedure to apply the rules to generate the strings. Note that one of these three terminating rules: $S \rightarrow A \mid B \mid \lambda$ is used in the first or last step only. Hence total combinations are $3 + 13*3 = 42$.
- (b) Print each rule applied by displaying as shown in the derivations below (or as a sequence of substituted lists with step number).
- (c) Use the string generator to test if one of the following derived strings is valid by matching against each of the generated strings or by using your own heuristics (thumb rules).

You may use the following list form to express the rules or you may choose a form of your choice.

((S (a S a) (b S b) (A) (B) ()) (A (a b a)) (B (b a b)))

The derived strings may be expressed as the lists:
(a b a), (b a b), (a a b a a) and so on.

RULES:

$S \rightarrow aSa \mid bSb \mid A \mid B \mid \lambda$

$A \rightarrow aba$

$B \rightarrow bab$

Recognize the following strings (the derivations are provided):

S => A => aba

S => B => bab

S => aSa => aAa => aabaa (recursion once)

S => aSa => aBa => ababa (recursion once)

S => bSb => baSab => baAab => baabaab (recursion twice)

S => aSa => abSba => abBba => abbabba (recursion twice)

S => aSa => aaSaa => aabSbaa => aab λ baa => aabbaa (recursion thrice)

S => bSb => bbSbb => bbaSabb => bba λ abb => bbaabb (recursion thrice)