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Q 2.15

Give a counterexample to show the following construction fails to prove that context free LAs is closed under star.

Let  $A$  be a CFL that is generated by CFG  $G = (V, \Sigma, R, S)$ . Add rule  $S \rightarrow SS$  this is  $G'$ .

$$G = (\{S\}, \{[, ]\}, \{S \rightarrow [S], S \rightarrow \epsilon\}, S)$$

$$G^* = \epsilon, [], [()], [()]^2, \dots$$

$$G' = (\{S\}, \{[, ]\}, \{S \rightarrow [S], S \rightarrow \epsilon, S \rightarrow SS\}, S)$$

$G'^*$  can equal  $[[]][[]]$ , which is not in  $G^*$ .

Therefore, the above fails to prove context free LAs is closed under star.