CS536: Homework 5

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Problem 1

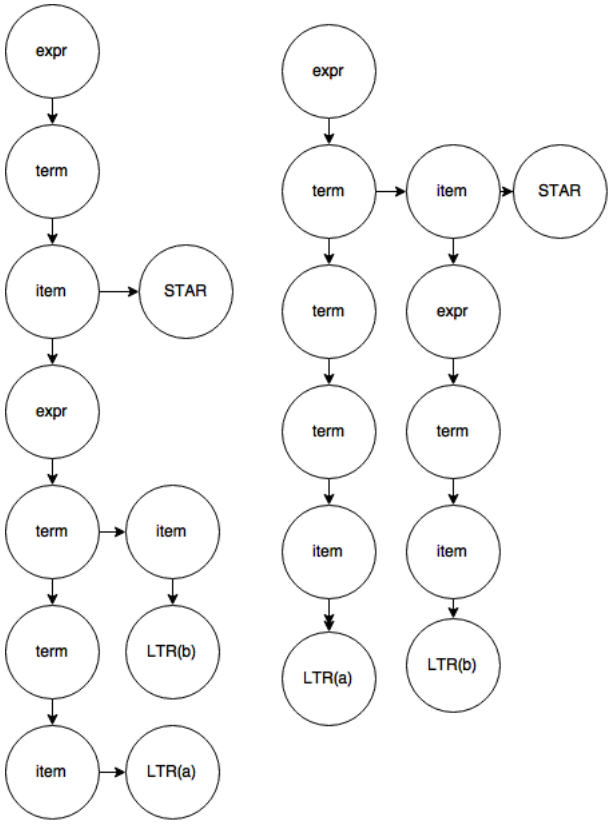
In the following problems, we assume that $a, b \in LTR$ are instances of letters.

CFG 1

The grammar fails to utilize the "factor" rule which would accept STAR.
An example of a legal expression not in the grammar: $a*$

CFG 2

Consider this parse tree on $ab*$



CFG 3

Once the "item" rule is reached, we can't loop back up to expressions, which makes it virtually impossible to generate nested expressions.

An example of a legal expression not in the grammar: $(a*)+$

CFG 4

(That is, "$LTR(a)|\epsilon$"; the epsilon in "term" rule allows this to occur)

An example of an illegal expression accepted by the grammar: $a|$

CFG 5

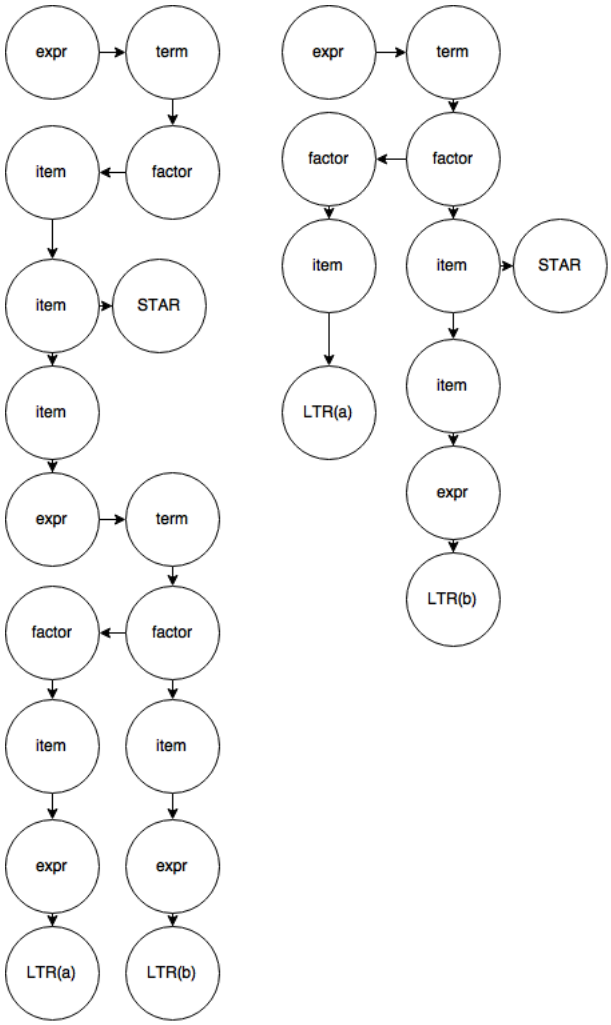
Similar to (3), the "item" does not tie back up to the "expr" rule, so we can't, for example, have expressions within a STAR or PLUS

An example of a legal expression not in the grammar: $(a)+$

CFG 6

Consider the parse tree on $ab*$

Here, we have 2 different parse trees on $ab*$, each implying its own meaning on $ab*$ (In the left tree, STAR "acts" on both ab, while in the right tree, STAR "acts" only on b)


expr
term
item
factor
item
STAR
item
expr
term
factor
factor
item
item
expr
expr
LTR(a)
LTR(b)
expr
term
factor
factor
item
item
STAR
item
expr
LTR(b)
LTR(a)